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NASA SP-7011 (160)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

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(Supplement 160)

NOVEMBER 1976

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (160)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 160)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in October 1976 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

Scientific and Technical Information Office
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 166 reports, articles and other documents announced during October 1976 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1976 Supplements.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A76-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche[1] are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., (A76-13400), when requesting publications.

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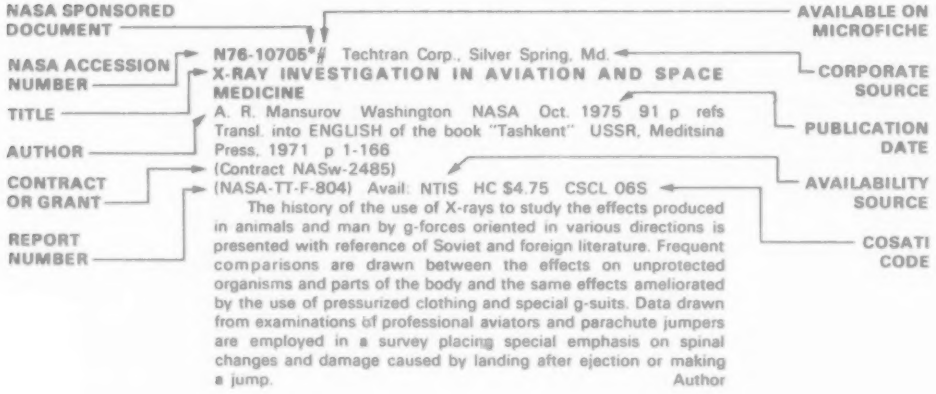
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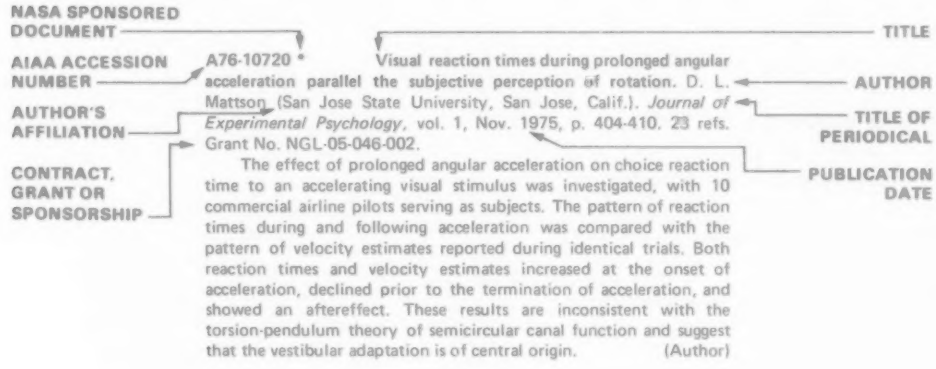
N76-10705*# Techtran Corp., Silver Spring, Md.
X-RAY INVESTIGATION IN AVIATION AND SPACE MEDICINE
A. R. Mansurov Washington NASA Oct. 1975 91 p refs Transl. into ENGLISH of the book "Tashkent" USSR, Meditsina Press, 1971 p 1-166
(Contract NASw-2485)
(NASA-TT-F-804) Avail: NTIS HC $4.75 CSCL 06S
The history of the use of X-rays to study the effects produced in animals and man by g-forces oriented in various directions is presented with reference of Soviet and foreign literature. Frequent comparisons are drawn between the effects on unprotected organisms and parts of the body and the same effects ameliorated by the use of pressurized clothing and special g-suits. Data drawn from examinations of professional aviators and parachute jumpers are employed in a survey placing special emphasis on spinal changes and damage caused by landing after ejection or making a jump. Author

TYPICAL CITATION AND ABSTRACT FROM *IAA*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PUBLICATION DATE
A76-10720 * Visual reaction times during prolonged angular acceleration parallel the subjective perception of rotation. D. L. Mattson (San Jose State University, San Jose, Calif.). Journal of Experimental Psychology, vol. 1, Nov. 1975, p. 404-410. 23 refs. Grant No. NGL-05-046-002.
The effect of prolonged angular acceleration on choice reaction time to an accelerating visual stimulus was investigated, with 10 commercial airline pilots serving as subjects. The pattern of reaction times during and following acceleration was compared with the pattern of velocity estimates reported during identical trials. Both reaction times and velocity estimates increased at the onset of acceleration, declined prior to the termination of acceleration, and showed an aftereffect. These results are inconsistent with the torsion-pendulum theory of semicircular canal function and suggest that the vestibular adaptation is of central origin. (Author)

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 160)

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IAA ENTRIES

A76-38316 **Solar energy utilization in photosynthesis.** G. Forti (Milano, Università, Milan, Italy). In: Energy and physics; Proceedings of the Third General Conference, Bucharest, Rumania, September 9-12, 1975. Geneva, European Physical Society, 1976, p. 375-378.

The process of photosynthesis in plants is described in detail with particular attention paid to energy balance. The possible development of a solar energy conversion technology using photosynthesis is discussed with reference to the following three areas: (1) hydrogen production in certain microalgae, (2) the use of photosynthesis in constructing photovoltaic cells, and (3) the use of photosynthetic microorganisms for the treatment of sewage water and other wastes for the purposes of water purification and biomass production.

B.J.

A76-38343 **Course on High Energy Radiation Dosimetry and Protection, 1st, International School of Radiation Damage and Protection, Erice, Italy, October 1-10, 1975, Proceedings.** Course sponsored by the Italian Ministry of Public Education, Italian Ministry of Scientific and Technological Research, and Associazione Italiana di Fisica Sanitaria e Protezione Contro le Radiazioni. *IEEE Transactions on Nuclear Science*, vol. NS-23, Aug. 1976. 127 p.

Articles dealing with the radiation environment of accelerator facilities and of spacecraft, radiation detection and dosimetry, personnel dosimetry, induced radioactivity and accelerator environments, applications of computers in health physics, evaluation of health risk and microdosimetry, and future radiation safety trends at fission and fusion reactors and accelerator facilities are presented. Particular papers deal in addition with personnel dosimetry during space missions, biological effects of small doses of radiation and of high-energy radiation, applications of high-energy physics techniques in medical research, radiation environment of storage rings, and shielding.

R.D.V.

A76-38346 * **Dosimetry during space missions.** J. V. Bailey (NASA, Johnson Space Center, Environmental Health Branch, Houston, Tex.). *(Course on High Energy Radiation Dosimetry and Protection, 1st, Erice, Italy, Oct. 1-10, 1975.) IEEE Transactions on Nuclear Science*, vol. NS-23, Aug. 1976, p. 1379-1384.

Comparative radiation hazards due to various sources of radiation in several prominent manned space missions are surveyed, along with techniques for coping with the hazards. Cosmic radiation of solar and galactic origin, and Van Allen belt radiation, are the major hazards outside the earth's geomagnetic shield, and were a major problem in the Apollo missions. The Skylab missions, while within the geomagnetic field, were subject to extensive exposure to the trapped radiation belts (Van Allen belts), while the Soyuz-Apollo test project involved orbiting at a lower altitude, with lower exposure. No solar particle bursts affected Apollo missions, and the Solar Particle Alert Network devised to help cope with the problem is described. Dosimetry practices and devices are described. Radiation experience and dose readings logged with the various missions are reported.

R.D.V.

A76-38347 **The biological effects of high-energy radiation.** S. B. Curtis (California, University, Berkeley, Calif.). *(Course on High Energy Radiation Dosimetry and Protection, 1st, Erice, Italy, Oct. 1-10, 1975.) IEEE Transactions on Nuclear Science*, vol. NS-23, Aug. 1976, p. 1414-1416. 15 refs.

The biological effects of high-energy radiation are reviewed, with emphasis on the effects of the hadronic component. Proton and helium ion effects are similar to those of the more conventional and sparsely ionizing X- and gamma-radiation. Heavy ions are known to be more biologically effective, but the long term hazard from accumulated damage has yet to be assessed. Some evidence of widely varying but dramatically increased effectiveness of very high-energy (about 70 GeV) hadron beams is reviewed. Finally, the importance of the neutron component in many situations around high-energy accelerators is pointed out.

(Author)

A76-38348 **Microdosimetry and the effects of small doses of radiation.** H. H. Rossi (Columbia University, New York, N.Y.). *(Course on High Energy Radiation Dosimetry and Protection, 1st, Erice, Italy, Oct. 1-10, 1975.) IEEE Transactions on Nuclear Science*, vol. NS-23, Aug. 1976, p. 1417-1421. Contract No. E(11-1)-3243; Grant No. NIH-CA-12536.

Energy distribution on a cellular or subcellular scale, and statistical treatment of events of random injury to individual cells by radiation, are stressed as central to microdosimetry. Different statistical patterns for different modes of radiation and different tissues are considered. Biological effects of radiation are known to depend on the species of bombarding particle and not solely on absorbed dose. Effects of radiation-induced lesions and possible synergistic effects of interacting pairs of sublesions, possible interactions between radiation-affected cells in carcinogenesis and the probable lack of such interaction in radiation-affected gametes are discussed.

R.D.V.

A76-38440 **Combining evidence presented simultaneously to the eye and the ear - A comparison of some predictive models.** A. Craig, W. P. Colquhoun (Medical Research Council, Perceptual and Cognitive Performance Unit, Brighton, Sussex, England), and D. W. J. Corcoran (Glasgow, University, Glasgow, Scotland). *Perception and Psychophysics*, vol. 19, no. 6, June 1976, p. 473-484. 4 refs. Research supported by the Ministry of Defence (Procurement Executive).

Data from a sustained monitoring experiment involving auditory, visual and combined audio-visual signal recognition were used to assess the predictive validity of five models of bisensory information processing. Satisfactory predictions of the dual-mode performance levels were made only by two models, neither of which assumes that the auditory and visual systems operate independently, and correlations which attest to this nonindependence are presented. One of these models explicitly assumes that the two systems are associated so that their judgments tend to coincide; the other assumes that the visual system 'alerts' the auditory system to the presence of a signal. Both models accurately predict the levels of efficiency and dual-mode criterion in the dual-mode condition, and the 'alerting' one also accounts for the observed reduction in response latencies.

(Author)

A76-38441 **Motion constancy dependent upon perceived distance and the spatial frequency of the stimulus pattern.** E. R. Wist, H. C. Diener, and J. Dichgans (Neurologische Universitätsklinik, Freiburg im Breisgau, West Germany). *Perception and Psychophysics*, vol. 19, no. 6, June 1976, p. 485-491. 16 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-70.

The relationship between perceived distance and perceived speed for object-motion perception was determined using a magnitude-estimation technique. It was found that perceived speed increases linearly with perceived distance when angular speed is held constant. Furthermore, it was found that the spatial frequency of a moving periodic stripe pattern potentiates the effect of perceived distance on perceived speed. The slope of the function relating perceived speed and perceived distance was found to increase linearly with increasing spatial frequency. The functional significance of these findings for motion constancy is discussed. (Author)

A76-38442 **The constancy of the orientation of the visual field.** H. Wallach and J. Bacon (Swarthmore College, Swarthmore, Pa.). *Perception and Psychophysics*, vol. 19, no. 6, June 1976, p. 492-498. 5 refs. Grant No. NIH-11089.

Evidence is presented that the perceived immobility of the environment during tilting of the head from side to side results from a compensating process. This compensating process operates well only when peripheral vision is present. An objectively stationary environment was, for instance, not perceived as immobile during head tilting when vision was confined to the macular region of the retina. The compensating process could be rapidly altered by exposure to environmental tilting during and dependent on head tilting. Such adaptation had the result that some environmental tilting that normally is perceived led to apparent immobility. (Author)

A76-38443 **Induced subject-relative movement - Persistence of apparent movement of a stationary point after removal of inducing stimulus.** R. H. Day, R. G. Dickinson, and K. I. Forster (Monash University, Clayton, Victoria, Australia). *Perception and Psychophysics*, vol. 19, no. 6, June 1976, p. 510-517. 10 refs. Australian Research Grants Committee Grant No. A65/15940.

The apparent movement of a stationary point of light in an otherwise dark field in the same direction as its immediately preceding induced movement (IM) is described. The effect is referred to as induced subject-relative movement (ISRM) and is confirmed and further investigated in four experiments. The purpose of the first experiment was to confirm earlier observations and verbal reports of ISRM and to record it by means of manual tracking. The second experiment was essentially the same as the first, except that after a period of IM of the spot the movement of the frame was merely stopped. In the third experiment, the spot was tracked for 5 sec both before and after IM with the moving frame. The fourth experiment was to establish whether ISRM follows real movement of the spot in a stationary frame. The results suggest that ISRM arises from the absence of a signal for cessation of perceived movement when the frame disappears. ISRM also occurred following nonlinear IM. S.D.

A76-38444 **The influence of selective attention in peripheral and foveal vision.** B. A. Ambler and D. L. Finklea (Texas, University, Arlington, Tex.). *Perception and Psychophysics*, vol. 19, no. 6, June 1976, p. 518-524. 11 refs. Research supported by the University of Texas.

Four series of experiments were conducted to investigate the role of attention processes in the discrimination of line slant and line arrangement differences in foveal and peripheral vision. The stimulus letters were upright T, and L and T tilted 30 deg clockwise from the vertical. Major findings are that distributed attention does not degrade foveal line arrangement discrimination if the attention system is overloaded by increasing the number of elements in the array, that line arrangement discrimination is reduced as letter number increases even when maximum density is held constant, and that concentrated attention facilitates line arrangement discrimination relative to line slant discrimination in foveal vision when element number and density are held constant. The data support the existence of two functionally different attention systems, the distributed system being much more sensitive to line slant differences than to line arrangement differences under conditions of high figure density. S.D.

A76-38619 **Biological evaluation of the toxicity of gases produced under fire conditions by synthetic materials. I - Methods and preliminary experiments concerning the reaction of animals to simple mixtures of air and carbondioxide or carbonmonoxide.** C. Herpol, R. Minne, and E. van Outryve (Gent, Rijksuniversiteit, Ghent, Belgium). *Combustion Science and Technology*, vol. 12, no. 4-6, 1976, p. 217-228. 12 refs. Research supported by the Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture and Fédération des Industries Chimiques de Belgique.

A76-38701 # **A study on examination procedures for preventing traumatic and nontraumatic osteoarthropathies related to flying activities (Studio sulle metodiche di esami per la prevenzione delle osteoartropatie traumatiche e non traumatiche legate all'attività di volo).** G. Rotondo. *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale*, vol. 38, Oct.-Dec. 1975, p. 375-391. 25 refs. In Italian.

X-ray checkup programs are recommended particularly for flying personnel engaging in aerobatics or who have experienced catapulted seat ejection. Injury statistics are cited for catapulted ejection subjects. Incidences of traumatic spinal injuries (fractures, infractions, lumbar kyphosis, lordosis, scoliosis, slipped disks) incompatible with normal flying activities were cited. Attention is also given to recurrent nontraumatic spinal lesions (undiagnosed infractions; osteoarthrotic conditions such as: spondyloarthrosis, rheumatoid arthritis, arthromuscular rheumatism, osteomyelitis, bursitis, arthrosynovitis, tenosynitis; minor discopathies). Timely detection and diagnosis of such lesions is stressed as important in prophylaxis and therapy. R.D.V.

A76-38702 # **Behavior of some respiratory parameters in student pilots - A comparative study on two distinct groups examined ten years apart (Comportamento di alcune grandezze respiratorie negli aspiranti piloti - Studio comparativo fra due gruppi diversi esaminati a dieci anni di distanza).** C. A. Ramacci (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) and G. Meineri. *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale*, vol. 38, Oct.-Dec. 1975, p. 392-402. In Italian.

A test is made of the hypothesis that some accepted static respiratory parameters might undergo changes with time due to physical anthropological (normal somatological) variations in the human sample population. Vital capacity, timed vital capacity (volume forcibly expired in first second), and the ratio of the two (Tiffeneau index) are studied for groups of pilot candidates examined medically in 1961-62 and in 1971-72. A 2 cm increase in height is reported for the latter group, but without significant differences in the other parameters. Caution backed up by periodic checks is recommended, however, and a report of a 30% normal anthropological increase in vital capacity in subjects studied over 1953-1966 is cited. R.D.V.

A76-38703 # **Making use of the laboratory in aerospace medicine (Utilizzazione del laboratorio in medicina aerospaziale).** G. Paolucci (Aeronautica Militare, Servizio Sanitario, Rome, Italy). *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale*, vol. 38, Oct.-Dec. 1975, p. 403-410. 12 refs. In Italian.

Some laboratory services are recommended as indispensable aids in diagnostic-prognostic and forensic work: ascertaining individual endogenous biomedical responses and eventual pathological states;

objective evaluation of emotional states in flight and in accident victims at time of death (through biochemical analysis); experimental and clinical traumatology; identification of accident victims and portions of cadavers severed and scattered over an area; tests determining whether an accident victim was alive at the time of impact or submersion. Toxicological, histological, histochemical (serotonin, histamine, hyalouronidase, carboxyhemoglobin) tests, erythrocyte sedimentation, thromboelastography, enzyme determinations, and urinary catecholamine analysis are mentioned. R.D.V.

A76-38704 # **Operational stress and higher psychic functions - Observations on flight crews and parachutists in various phases of a parachute jump mission (Stress operativo e funzioni psichiche superiori - Osservazioni su equipaggi di volo e paracadutisti nelle varie fasi di un aviolancio militare).** L. Longo. *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale,* vol. 38, Oct.-Dec. 1975, p. 411-426. 31 refs. In Italian.

The jump mission is divided into three phases: pre-jump (mission briefing and preparation, harnessing, checkout, emplanement and takeoff, connecting to rip cord, moving to jump door), jump (exit, chute opening shock, deployment of canopy), and post-jump (descent maneuvers, impact on ground, release from harness and mission action). Interview and interrogatory procedures are outlined; sensory-perceptive response mechanisms are reviewed. Emotive and affective states in all phases and subphases are considered, including psychological identification of rip cord and umbilical cord, waiting anxieties, attention, evaluation, decision making, and stress levels. R.D.V.

A76-38705 # **Verification of hemostasis disorders in air force personnel (Accertamento di difetti dell'emostasi in personale aeronautico).** G. Blundo, G. Paolucci (Aeronautica Militare, Servizio Sanitario, Rome, Italy), and P. Rota. *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale,* vol. 38, Oct.-Dec. 1975, p. 427-432. In Italian.

Results of a survey conducted on air force enlistees to ascertain the presence or likelihood of hemostasis disorders are reported. Case histories included reviews of family history for cases of easy hemorrhaging, reviews of personal history for prolonged contact with solvents, lubricants, paints and varnishes, other toxic substances (drugs, poisons) impairing blood clotting action, or diseases contributing to that effect. The efficiency of hemostatic processes in each subject was investigated via determination of Quick's time, partial thromboplastin time, thromboelastographic traces, and platelets counts. Less than 3% of the subjects exhibited problems with hemostasis, in some cases temporary states due to ingestion of prescribed drugs, and no correlation between work history and hemostasis was found. R.D.V.

A76-38706 # **Motivational problems in candidate pilots (Sul problema motivazionale in aspiranti piloti).** F. Sparvieri. *(NATO, AGARD, Aerospace Medical Panel Specialists Meeting, 32nd, Ankara, Turkey, Oct. 21-24, 1975.) Rivista di Medicina Aeronautica e Spaziale,* vol. 38, Oct.-Dec. 1975, p. 433-444. In Italian.

The paper presents a comparative examination of the answers to questions reported in a biographical questionnaire submitted to 104 candidate pilots and 111 candidate engineers, in occasion of a competition for admission to the Italian Air Force Academy. The results of this investigation support the opinion that candidate pilots are, in general and in comparison to candidate engineers, less inclined to long-lasting and rigorous learning activities and are characterized by a greater frankness and a lesser conformity. (Author)

A76-38707 # **Notes on flight-related psychosyndromes, in particular phobic syndromes (Considerazioni sulle psicosindromi connesse al volo, con particolare riguardo a quelle fobiche).** E. D'Antino. *Rivista di Medicina Aeronautica e Spaziale,* vol. 38, Oct.-Dec. 1975, p. 448-473. 34 refs. In Italian.

Several classifications of work-related phobias are presented, generally following the lines of Missenard et al. (1967). Phobias in general, phobias related to work and fatigue, secondary phobic syndromes deriving from work-related psychic traumata or from neurotic processes independent of work are considered. Symptomatologies of psychic fatigue and exhaustion are outlined, along with psychogenic reactions, paroxysmic anxiety episodes, and flight-related floating anxieties. Prophylaxis and therapy of flight-related psychosyndromes are considered briefly. R.D.V.

A76-38801 **Glucagon and plasma catecholamines during beta-receptor blockade in exercising man.** H. Galbo, J. J. Holst, N. J. Christensen, and J. Hilsted (Copenhagen, University; Bispebjerg Hospital, Copenhagen; Kommunehospitalet, Aarhus, Denmark). *Journal of Applied Physiology,* vol. 40, June 1976, p. 855-863. 37 refs. Research supported by the Danish Medical Research Council and Idraettens Forskningsrad.

Seven men ran at 60% of individual maximal oxygen uptake to exhaustion during beta-adrenergic blockade with propranolol (P), during lipolytic blockade with nicotinic acid (N), or without drugs (C). The total work times differed significantly. Epinephrine rose progressively above pre-exercise levels; at exhaustion concentrations in P experiments were larger than in N and C experiments. Norepinephrine increased consistently while insulin decreased. After an initial decrease glucagon concentrations increased progressively in parallel with declining plasma glucose and were at exhaustion always three times pre-exercise values. Thus beta-adrenergic blockade did not diminish the glucagon response. Nor was this reponse increased when alpha-receptor stimulation in P experiments was intensified. Carbohydrate combustion was smaller and nonesterified fatty acids (NEFA) and glycerol concentrations in serum larger during C experiments. Alanine concentrations were never raised at exhaustion. Accordingly, neither stimulation of adrenergic receptors nor NEFA and alanine concentrations are major determinants for the exercise-induced glucagon secretion in man. It is suggested that decreased glucose availability enhances the secretion of glucagon and epinephrine during prolonged exercise. (Author)

A76-38802 **Respiratory and other responses in subjects immersed in cold water.** K. E. Cooper, S. Martin, and P. Riben (Calgary, University, Calgary, Alberta, Canada). *Journal of Applied Physiology,* vol. 40, June 1976, p. 903-910. 11 refs. Research supported by the Defence Research Board of Canada; Contract No. N00014-72-C-0098.

Subjects have been immersed in water at 27 C and 10 C and while immersed their respiratory rates, minute volumes, and end-tidal CO2 partial pressure levels were measured. Measurements were made with the subjects at rest, exercising at approximately 0.8 liter oxygen/min, and very vigorously at 1.8-2.0 liters oxygen/min. Immersion in the cold water caused an increase in respiratory rate and a fall in end-tidal CO2. At the moderate rate of exercise the hyperventilation persisted in relation to the oxygen demand and there was still a significant reduction in end-tidal CO2. At the greatest rates of exercise, the end-tidal CO2 did not differ from that obtained in similar rates of exercise in warm water. Preheating the subject in a sauna so as to increase skin temperature, with minimal change in body temperature, greatly attenuated the ventilatory and end-tidal CO2 responses to cold water immersion. (Author)

A76-38803 * **Plasma vasopressin and renin activity in women exposed to bed rest and +G/z/ acceleration.** L. C. Keil and S. Ellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Journal of Applied Physiology,* vol. 40, June 1976, p. 911-914. 24 refs.

To study the effect of prolonged recumbency on plasma vasopressin and renin activity, eight women were subjected to 17 days of absolute bed rest. The tolerance to +3G vertical acceleration of the subjects was tested before and after 14 days of bed rest. From day 2 and through day 17 of bed rest, plasma arginine vasopressin (AVP) levels were reduced 33%. Plasma renin activity (PRA)

increased 91% above ambulatory control values from days 10 through 15 of bed rest. When compared to precentrifuge values, exposure to vertical acceleration prior to bed rest provoked a 20-fold rise in mean plasma AVP but resulted in only a slight increase in PRA. After bed rest, acceleration increased plasma AVP 7-fold; however, the magnitude of this increase was less than the post +3G acceleration value obtained prior to bed rest. After bed rest, no significant rise was noted in PRA following +3G acceleration. This study demonstrates that prolonged bed rest leads to a significant rise in the PRA of female subjects, while exposure to positive vertical acceleration provokes a marked rise in plasma AVP. (Author)

A76-38930 **Orthogonal electrocardiogram, apex cardiogram, and atrial sound in normotensive and hypertensive 50-year-old men.** J. Wikstrand, G. Berglund, L. Wilhelmsen, and I. Wallentin (Goteborg, Universitet, Goteborg, Sweden). *British Heart Journal*, vol. 38, Aug. 1976, p. 779-789. 36 refs. Research supported by the Swedish National Association against Heart and Chest Diseases and Bank of Sweden; Swedish Medical Research Council Grants No. K73-19X-4131-01; No. B74-19X-4229-01A.

A76-38990 **Acute changes in animal inner ears due to simulated sonic booms.** S. Reinis (Waterloo, University, Waterloo, Ontario; Toronto, University, Toronto, Canada). *Acoustical Society of America, Journal*, vol. 60, July 1976, p. 133-138. 17 refs. Research supported by the Ministry of Transport of Canada and Transportation Development Agency.

Experiments were conducted on C57BL/6J inbred male mice which were subjected to simulated sonic booms of different rise time, intensity, and number of sonic booms. The paper describes one pathological finding in the inner ears of the mice, viz., bleeding into the scala tympani in the basal turn of the cochlea. Even a single superboom of 10-psf peak overpressure and a 5-msec rise time, or a single boom having a short rise time of 0.1 msec and a peak overpressure of 3.3 psf, causes this pathological change. The effects of a short series of simulated sonic booms can be cumulative, as two or more booms administered at 10-sec intervals can cause bleeding, whereas one does not. In addition, only five successive booms at a rate of one every 24 hr produced a cumulative effect. The main cause of bleeding in the scala tympani is probably a mechanical stretching of the basilar membrane, resulting in the rupture of either the outer or inner spiral blood vessels located on the tympanic side of the basilar membrane. S.D.

A76-39009 **Neutron diffraction studies of retinal rod outer segment membranes.** H. Saibil (King's College, London, England), M. Chabre (Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaires de Grenoble, Grenoble, France), and D. Worcester (Atomic Energy Research Establishment, Materials Physics Div., Harwell, Berks., England). *Nature*, vol. 262, July 22, 1976, p. 266-270. 18 refs. Research supported by the Centre National de la Recherche Scientifique and Délégation Générale à la Recherche Scientifique et Technique.

Neutron diffraction measurements on isolated retinal rod outer segments show that most of the visual pigment protein, rhodopsin, is embedded in the hydrophobic core of the disk membrane. A very slight outward shift of protein at the cytoplasmic side of the membrane is associated with pigment bleaching. (Author)

A76-39207 **Physiology of emotion (Fiziologiia emotsii).** Edited by L. P. Latash and G. A. Stepanskii. Moscow, VINITI (Itogi Nauki i Tekniki, Seriia Fiziologiia Cheloveka i Zhivotnykh. Volume 15), 1975. 155 p. In Russian.

This collection of three reviews deals with emotional reinforcement and its neurophysiological mechanisms, emotions as related to the significance of some mediators and hormones in the mechanisms underlying the onset and maintenance of emotional states, and emotions and sleep. The first review emphasizes the brain substrate of self-stimulation along with the polyvalent effects of stimulation and the role of ecological and ethological factors in behavior. The second review characterizes essentially the participation of biogenic amines in the processes of initiation of emotional states, including emotional stress. The third review is mainly concerned with the interrelationships of emotional processes and sleep as an active state of the brain whose fulfillment depends on the activity of the cerebral structure of emotions. S.D.

A76-39397 * **Closed system Fischer-Tropsch synthesis over meteoritic iron, iron ore and nickel-iron alloy.** D. W. Nooner, J. M. Gibert, E. Gelpi, and J. Oro (Houston, University, Houston, Tex.). *Geochimica et Cosmochimica Acta*, vol. 40, Aug. 1976, p. 915-924. 34 refs. Grant No. NCA2-OP295-501.

Experiments were performed in which meteoritic iron, iron ore and nickel-iron alloy were used to catalyze (in Fischer-Tropsch synthesis) the reaction of deuterium and carbon monoxide in a closed vessel. Normal alkanes and alkenes and their monomethyl substituted isomers and aromatic hydrocarbons were synthesized. Iron oxide and oxidized-reduced Canyon Diablo used as Fischer-Tropsch catalysts were found to produce aromatic hydrocarbons in distributions having many of the features of those observed in carbonaceous chondrites, but only at temperatures and reaction times well above 300 C and 6-8 h. B.J.

A76-39548 **A multistable movement display - Evidence for two separate motion systems in human vision.** A. Pantle and L. Picciano (Miami University, Oxford, Ohio). *Science*, vol. 193, Aug. 6, 1976, p. 500-502. 10 refs. Contract No. F33615-74-C-4032.

Two competing sensations of apparent movement were produced by the rapid alternation of two multielement stimulus frames. Either sensation could be made dominant by appropriate manipulations of the stimulus display. The results suggest that there are two systems capable of generating movement signals in man. One system depends on preliminary processing of form, and the second system does not. (Author)

A76-39549 # **Anxiety and performance - A study concerning the prediction of predictability (Ängstlichkeit und Leistung - Eine Untersuchung zur Vorhersage der Vorhersagbarkeit).** H. Giesen (Deutsches Institut für internationale pädagogische Forschung, Frankfurt am Main, West Germany), T. Ehlers, and M. Geyer (Marburg, Universität, Marburg an der Lahn, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, 2nd Quarter, 1976, p. 175-189. 29 refs. In German.

An investigation is conducted regarding the moderator effect of the personality trait 'anxiety' on the predictability of the performance of students. A hypothesis concerning the relation between anxiety and performance predictability is considered and a description is given of tests conducted with university and high-school students. The test results show that the degree of predictability in the case of students with a medium anxiety level is better than the predictability value obtained for students with low and high anxiety levels. The differences in predictability appear to be more pronounced for female students. G.R.

A76-39550 # **Learning in the case of aversion-related signal concepts under conditions of avoidance and nonavoidance of the aversive situation (Zum Lernen von aversionsbezogenen Signalkonzepten unter den Bedingungen Vermeidung und Nichtvermeidung der aversiven Situation).** U. Grau (München, Technische Universität, Munich, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, 2nd Quarter, 1976, p. 190-218. 34 refs. In German.

The possibility of a learning of acts which are designed to avoid pain stimuli is considered and a study is conducted regarding the effect of such a possibility on the acquisition of signal concepts for the aversion-related subsequent event and the neutral subsequent stimuli. The results of tests conducted with two groups of subjects

suggest that the avoidance motive can, under certain conditions, interfere with the information intake. G.R.

A76-39576 **Space flight effects on the skeletal muscles of rats.** E. I. Il'ina-Kakueva, V. V. Portugalov, and N. P. Krivenkova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 700-703. 6 refs.

Morphological and histochemical examinations of the skeletal muscles of rats flown for 22 d aboard the Cosmos-605 biosatellite have demonstrated atrophic and dystrophic developments in the soleus muscle accompanied by metabolic changes in the muscle tissue. The changes were reversible but did not disappear entirely 27 d postflight. Early atrophic developments were seen in the m. gastrocnemius, m. quadriceps, and m. ext. digitorum longus on the second postflight day. The comparative study of the muscles of flight and simulation rats has shown that pathology developed in the muscles as a result of diminished motor activity of animals being aggravated by weightlessness. (Author)

A76-39577 **Cytochemical investigations of proteins and RNA in spinal motoneurons and neurons of spinal ganglia of the rat after space flight.** A. V. Gorbunova and V. V. Portugalov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 708-710. 22 refs.

A76-39578 **Cardiac pathology associated with high sustained +G/z/. I - Subendocardial hemorrhage.** R. R. Burton and W. F. MacKenzie (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 711-717. 19 refs.

Adult miniature swine were exposed to various levels and durations of +G/z/ (positive vertical acceleration). After exposure, all swine were euthanized and necropsied. Gross, histologic, and electron microscopic observations were made on the heart tissue. Subendocardial hemorrhage (SEH) was commonly found in the left ventricle, rarely in the right ventricle, and its severity was directly related to the level and duration of G exposure, heart rate, and catecholamine activity. SEH was made more severe with i.v. atropine 4 mg, and prevented with i.v. propranolol 20 mg. Heart hemorrhage was usually limited to the immediate subendocardial region and frequently surrounded Purkinje's fibers. In severe cases, however, hemorrhages penetrated several millimeters into the heart muscle and sometimes penetrated Purkinje's fibers. Restraint of unanesthetized swine in the centrifuge couch, low G-levels, and/or i.v. injections of atropine or epinephrine produced minimal SEH lesions. (Author)

A76-39579 **Cardiac pathology associated with high sustained +G/z/. II - Stress cardiomyopathy.** W. F. MacKenzie, R. R. Burton, and W. I. Butcher (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 718-725. 45 refs.

The myocardial pathology of 14 pigs exposed to high sustained vertical acceleration stress of 9 and 15, or 3, 7, and 9 G was studied; six control pigs were used as comparisons. Four pigs received propranolol prior to centrifugation and four pigs received atropine. Hearts were studied by light and electron microscopy. Myocardium from stressed pigs showed myofibrillar degeneration, pooling of mitochondria, and cell death. Lesions occurred in random cells of the subendocardium and papillary muscles. Purkinje fibers were also involved. Pretreatment with atropine increased the number of dead cells found and propranolol increased the number of cells showing myofibrillar degeneration. It is postulated that this is a pluricausal cardiomyopathy similar to several experimental conditions. Significance to aerospace medicine is briefly discussed. (Author)

A76-39580 **Changes in clinical cardiologic measurements associated with high +G/z/ stress.** K. K. Gillingham and P. P. Crump (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 726-733. 28 refs.

The effects of high vertical acceleration on cardiac function were studied in two groups of subjects using noninvasive techniques (ECGs, vectorcardiograms, systolic time intervals, maximal treadmill stress tests). In a group exposed to three 40 sec runs at 8 G and two 40 sec runs at 10 G in one day, moderate cutaneous petechiasis developed, serum total CPK and LSH levels rose, and the pre-ejection period decreased 48 hr post-stress. A similar decrease in pre-ejection period was observed in subjects exposed to one 100 sec variable G maneuver peaking twice at 8 G for 3 sec, once a week for three weeks. There were transient T-loop angle changes. It is concluded that there is no clear evidence of compromised cardiac performance resulting from the G stress imposed in these studies. C.K.D.

A76-39581 **Space flight effects on skeletal bones of rats - Light and electron microscopic examination.** V. S. Iagodovskii, L. A. Triftanidi, and G. P. Gorokhova (Ministry of Health, Central Research Institute of Traumatology and Orthopedics, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 734-738. 21 refs.

Long tubular bones of Wistar rats that were flown for 22 d onboard the Cosmos-605 biosatellite and were exposed to a ground-based simulation experiment were examined in light and electron microscopes. About half of the flight rats showed osteoporosis of metaphyses which was usually combined with a decrease of the mass of the primary spongiosa in the vicinity of the epiphyseal cartilaginous plate. This gives evidence that the growth of the bones could have been inhibited in flight. The light and electron microscopy of bones of flight rats revealed wide osteocyte lacunae which could have been produced by perilacunar osteolysis. In the simulation experiment, reduction in the metaphyseal spongiosa occurred only in one-third of the rats and was less pronounced than in flight rats; no decrease of the mass of the primary spongiosa near the cartilaginous plate was noted. Histological investigation of bones 27 d postflight demonstrated that that time period was not enough to eliminate all the changes in the bones tested. (Author)

A76-39582 **Effect of pre-adapting spectral stimuli on visual responses.** G. T. Chisum (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 739-745. 6 refs.

Electroretinograms (ERGs) were recorded following preadapting exposures to radiometrically and photometrically matched spectral stimuli. The magnitudes of three aspects of the ERG varied as a function of the adapting wavelength. Longer wavelength preadapting stimuli produced less suppression of the response magnitudes than stimuli from the short wavelength end of the spectrum. The implications of the findings for display design and cockpit-light-source design and management are discussed. (Author)

A76-39583 **Space flight effects on the hemopoietic function of bone marrow of the rat.** V. N. Shvets and V. V. Portugalov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 47, July 1976, p. 746-749.

The 22-d orbital flight of rats onboard the Cosmos-605 biosatellite was followed by inhibition of erythroblastosis, alteration in the morphology of megakaryocytes, and stimulation of myelopoiesis. These changes returned to normal 27 d postflight. The colony-forming capacity and pattern of differentiation of hemopoietic stem cells of bone marrow of flight rats remained undisturbed. (Author)

A76-39584 * **Cardiovascular function during sustained +G/z/ stress.** H. H. Erickson, H. Sandler, and H. L. Stone (NASA,

Ames Research Center, Moffett Field, Calif.; USAF, School of Aerospace Medicine, Brooks AFB; Texas, University, Galveston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, July 1976, p. 750-758. 29 refs. NASA Order A-94544.

The development of aerospace systems capable of very high levels of positive vertical accelerators stress has created a need for a better understanding of the cardiovascular responses to acceleration. Using a canine model, the heart and cardiovascular system were instrumented to continuously measure coronary blood flow, cardiac output, left ventricular and aortic root pressure, and oxygen saturation in the aorta, coronary sinus, and right ventricle. The animals were exposed to acceleration profiles up to +6 G, 120 s at peak G; a seatback angle of 45 deg was simulated in some experiments. Radiopaque contrast medium was injected to visualize the left ventricular chamber, coronary vasculature, aorta, and branches of the aorta. The results suggest mechanisms responsible for arrhythmias which may occur, and subendocardial hemorrhage which has been reported in other animals. (Author)

A76-39585 **Application of hyperbaric oxygen therapy in a case of prolonged cerebral hypoxia following rapid decompression.** P. J. Sheffield and J. C. Davis (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, July 1976, p. 759-762. 20 refs.

The use of hyperbaric oxygen (HBO) in the treatment of prolonged cerebral hypoxia is reported in an incident involving a USAF T-39 aircraft that underwent rapid decompression from 753 mb (2438 m) to 148 mb (13,716 m). Within 5 to 8 s, the pilot lost consciousness because he did not don his oxygen mask and, therefore, was unable to obtain supplemental oxygen immediately. After a delay of 6 to 8 min, he was given supplemental oxygen at and below 697 mb (3048 m). On the ground, the pilot was blind and disoriented. This condition persisted for 6.5 h, at which time HBO was administered. Orientation and vision were regained; neurologic findings were negative. It is concluded that HBO therapy was effective in treating this case of prolonged cerebral hypoxia. The report shows the potential application of HBO in the treatment of prolonged cerebral hypoxia, and demonstrates the need for developing safe procedures for descent of passenger aircraft following such decompressions. (Author)

A76-39586 **Effects of time zone changes on performance and physiology of airline personnel.** F. S. Preston, S. C. Bateman, F. W. Meichen, R. Wilkinson, and R. V. Short (British Airways, Medical Service, Heathrow Airport; E. Merck, Ltd., London; Medical Research Council, Applied Psychology Unit, Cambridge, England; Medical Research Council, Reproductive Biology Unit, Edinburgh, Scotland). *Aviation, Space, and Environmental Medicine*, vol. 47, July 1976, p. 763-769. 5 refs.

The effect of time zone changes on the performance and menstrual cycles of 16 airline personnel was investigated. Three groups of four women each were subjected to two 8 hr time retardations over a period of four days, simulating westerly flight; an additional group of four women served as a control. Mepiprazole hydrochloride was administered to some subjects. Results showed impaired performance in individuals subjected to time zone changes. These were associated with severe sleep loss and may have been aggravated by the fact that the circadian cycle of body temperature was fairly well maintained, so that some work periods were carried out when body temperature was low. This effect is more pronounced in westerly flights than in easterly flights. There were no significant changes in menstrual cycle, and the drug failed to alleviate the effects of time zone change. C.K.D.

A76-39587 **Psychotherapy and return to flying duties.** C. B. Steinbacher and C. J. G. Perry (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, July 1976, p. 770-772. 10 refs.

A study was made of 112 cases referred to the USAF School of Aeronautical Medicine for psychiatric consultation. In 58 cases the patient was disqualified from flight duty on psychiatric grounds. Of the 49 cases for which follow-up information was available, 38 received treatment; 18 of these eventually returned to flight duty, along with six who did not receive treatment. The high percentage of salvaged flight personnel (49%) indicates that current psychiatric illness or a history of psychiatric illness is not sufficient reason, in and of itself, to permanently disqualify trained personnel from flight duties. C.K.D.

A76-39588 **Resonance ultrasonic measurements of microscopic gas bubbles.** J. W. Horton (IBM Scientific Center, Palo Alto, Calif.) and C. H. Wells (Texas, University, Galveston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, July 1976, p. 777-781. 10 refs. Contract No. N00014-68-A-0105-0003.

A pulsed, ultrasonic echo-ranging system employing the principle of bubble resonance for the location and identification of stationary or moving bubbles in the tissues of living organisms is described. The device is based on a piezoceramic transducer which is electromagnetically resonant at 230 kHz. The damping constant of the piezoceramic element was selected to approximate that of a resonant hydrogen bubble in water. Computer-processed echoes from bubbles in a water bath or introduced into the jugular veins of anesthetized dogs displayed a characteristic line-narrowing in the Fourier domain. Changes in signal frequency allow identification of bubbles in a wide size range. C.K.D.

A76-39683 **Structure and properties of a single channel in the human visual system.** H. Mostafavi and D. J. Sakrison (California, University, Berkeley, Calif.). *Vision Research*, vol. 16, no. 9, 1976, p. 957-968. 6 refs. NSF Grant No. GK-37282.

Previous experiments have indicated that the visual system can be represented as a collection of parallel channels with detection occurring whenever activity in any one of these channels reaches a certain level. In this paper we examine the structure of such a channel and show that it must be represented by an incoherent, rather than a coherent, type of detection. We then examine the following properties of the detection mechanism of a single channel: the angular bandwidth, the radial bandwidth, and the nonlinearity involved in the incoherent detection operation. (Author)

A76-39684 **Perceptual latencies to sinusoidal gratings.** U. Lupp, G. Hauske, and W. Wolf (München, Technische Universität, Munich, West Germany). *Vision Research*, vol. 16, no. 9, 1976, p. 969-972. 18 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Simple visual reaction time (RT) to suprathreshold sinusoidal gratings was determined as a measure of perceptual latency. As parameters, spatial frequency, exposure duration and modulation were varied. With three subjects, RT was found to increase with increasing spatial frequency. High contrast gives shorter RTs than low contrast. In the range investigated the effect of contrast is small compared with that of spatial frequency. At constant spatial frequency exposure durations of 30-60 msec produce shortest RTs. Underlying physiological mechanisms are considered. Some evidence comes from different temporal behavior of X- and Y-system but central mechanisms are also supposed to be involved. (Author)

A76-39685 **The significance of frequency gradients in binocular grating perception.** H. R. Wilson (Chicago, University, Chicago, Ill.). *Vision Research*, vol. 16, no. 9, 1976, p. 983-989. 13 refs.

It has previously been reported that when pairs of sinusoidal spatial gratings of slightly different frequencies are viewed stereoscopically, subjects perceive a plane tilted in depth. This result was assumed to provide evidence for the operation of a narrow band, Fourier analysis type of mechanism in binocular vision. When any uniformly textured surface is physically rotated in depth, however, texture gradients are introduced into the monocular projections. Experiments were performed to compare the tilt effect obtained with sinusoidal gratings to that obtained when appropriate spatial

frequency gradients were present. In all cases the frequency gradient patterns were more effective in producing the tilt effect. As these patterns have broad band Fourier spectra, it is argued that the results cannot be accounted for by narrow band Fourier models of binocular vision. An explanation is then offered in terms of the spatial inhomogeneity of the human visual system. (Author)

A76-39686 **Visual detection of patterns periodic in two dimensions.** G. J. Burton (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 16, no. 9, 1976, p. 991-998. 27 refs.

Single- and multiple-channel models, proposed in earlier investigations of visual contrast threshold detection of linear patterns, are extended to apply to two-dimensional space. It is shown that such models do not provide accurate predictions of contrast threshold values of patterns with two-dimensional structure. It is suggested that detection mechanisms exist which are size-tuned in both dimensions. (Author)

A76-39687 **Evoked potentials and visual acuity (Potentiels évoqués et acuité visuelle).** Y. Grall, F. Rigaudiere, S. Delthil, J. F. Legargasson, and J. Sourdille (Paris VII, Université, Paris; Institut National de la Santé et de la Recherche Médicale, St. Denis, Seine-St-Denis, France). *Vision Research*, vol. 16, no. 9, 1976, p. 1007-1012. 45 refs. In French.

A method is presented to aid an objective appraisal of visual acuity, demonstrating coincidence in the perception of a significant detail and analysis of visual evoked potentials resulting from that perception. A stimulator displaying an invertible checkerboard pattern and constant luminance is employed in the method, for quantifying the results. Eighty percent agreement with other tests is obtained in the case of patients suffering from various ophthalmic irregularities, the other 20 percent being associated with disturbances of visual function reflected in EEG. Possible improvements in the method are suggested. R.D.V.

A76-39688 **Spatial pooling properties deduced from the detectability of FM and quasi-AM gratings - A reanalysis.** N. Graham and B. E. Rogowitz (Columbia University, New York, N.Y.). *Vision Research*, vol. 16, no. 9, 1976, p. 1021-1026. 15 refs.

Arguments advanced by Stromeyer and Klein (1975) on models of spatial pattern detection and spatial pooling mechanisms, using three distinct types of grating - sinusoidal, FM, and quasi-AM gratings - are challenged. It is claimed that the simple sinusoidal and FM gratings are not psychophysically equally detectable. Properties of the receptive fields of neural units, stimulation maps, symmetry properties, pure peak detection, and spatial pooling discussed by other authors are reviewed critically. Models with different bandwidth, spatial pooling, and probability summation characteristics are considered, but the reanalysis is restricted to the model entertained by Stromeyer and Klein. R.D.V.

A76-39710 # **Measuring the magnetic fields of the human heart, brain, muscles, and lungs (Mereni magnetickych poli lidskeho srdce, mozku, svalu a plic).** M. Odehnal and V. Petricek (Ceskoslovenska Akademie Ved, Ustav Jaderne Fyziky, Prague, Czechoslovakia). *Ceskoslovensky Casopis pro Fyziku, Sekce A*, vol. 26, no. 3, 1976, p. 254-269. 31 refs. In Czech.

The paper sets forth elementary theory of the electric and magnetic field vectors of the heart and describes some experimental setups for detection of magnetic fields surrounding the human heart, brain, muscles and lungs. Results of recent biomagnetic experiments are summarized. A mathematical model of the electric and magnetic phenomena in the heart is proposed, and a demonstration of how a magnetic field could be induced around the heart reveals that it is possible that a magnetocardiogram can contain some information not recorded in the ECG. The block diagram of a superconducting quantum magnetometer is shown and discussed, and its promise for measuring magnetic field gradients is evaluated. P.T.H.

A76-39714 **Canadian remote manipulator system for NASA Space Shuttle.** I. Reid. *Engineering Journal*, vol. 59, May-June 1976, p. 12, 13.

Contracts for the preliminary design of a Shuttle Remote Manipulator System (SRMS) and for the design and construction of a simulation facility have been awarded to a Canadian four-company team. The servo-operated SRMS will provide capability for maneuvering payloads measuring up to 60 ft in length and 15 ft in diameter, and must be able to deploy a 32,000 lb payload within a tight time frame. The 50-foot jointed arm will be operated in either automatic or manual modes. Also under development is a Module Exchange Manipulator, which will remove and replace modules in orbiting satellites. Full-sized demonstration hardware has been successfully tested. C.K.D.

A76-39727 # **Application of digital filtering and data compression to biomedical signal processing and telemetry.** V. Cappellini, E. Del Re, A. Evangelisti, and M. Pastorelli (Firenze, Università, Florence, Italy). *International Federation for Medical and Biological Engineering, International Congress on Medical and Biological Engineering, 11th, Ottawa, Canada, Aug. 2-6, 1976, Paper.* 3 p.

The application of some digital filtering and data compression methods to processing and telemetering biomedical signals is described. Special digital filters of nonrecursive and recursive type, having high efficiency, are proposed. Two data compression methods are described: one using an adaptive prediction method with two amplitude tolerances and the other using first-order spline functions. Experimental results, obtained in processing ECG signals, are reported: compression ratios in the range of 2 to 10 are obtained with rms and peak errors in the range of 1 to 7 per cent. (Author)

A76-39757 **X-ray 3-D coded aperture imaging - Displaying the heart.** E. Klotz and H. Weiss (Philips Forschungslaboratorium Hamburg GmbH, Hamburg, West Germany). *Applied Optics*, vol. 15, Aug. 1976, p. 1913-1918. Research supported by the Bundesministerium für Forschung und Technologie. BMFT Project LMB-741.

The coded aperture imaging technique using an array of X-ray sources for display of three-dimensional objects is applied to a relevant medical object: the coronal vascular system of an isolated heart filled with contrast medium, coded according to a non-redundant point distribution. Arbitrary layers of the heart are decoded by correlation using a holographic system. The course of the vessels in the third dimension can clearly be followed, thus presenting a completely novel tool of medical diagnosis. (Author)

A76-39850 # **A study of handling quality assessment in manual control system.** M. Abe (Jizai-Engineering Co., Ltd., Tokyo, Japan) and O. Hirao (Tokyo, University, Tokyo, Japan). *Tokyo, University, Institute of Industrial Science, Report*, vol. 25, Jan. 1976, p. 81-105. 33 refs. In Japanese, with abstract in English.

Analytical methods are proposed to facilitate a quantitative formalization of the evaluation of automobile handling qualities and design parameters affecting the dynamic properties of an automobile as a human-machine system. The human part of the relations is derived from work based on aircraft pilot ratings, and the vehicle is treated as a linear feedback control system. A transfer function is developed for the ideal optimally trained and functioning human driver. Analytical techniques developed in the study are applied to the handling qualities of a VTOL aircraft in a hover mode. The results are compared to a comparative NASA experimental study, and good agreement is found. R.D.V.

A76-40111 # **On the detection of the magnetic heart vector - An application of the reciprocity theorem.** J. Malmivuo (Helsinki University of Technology, Otaniemi, Finland). *Acta Polytechnica Scandinavica, Electrical Engineering Series*, no. 39, 1976. 112 p. 71 refs. NSF Grant No. APR-72-03447-A03.

Lead field theory was used to develop two new lead systems (the ABC lead system and the unipositional lead system) for detecting the magnetic heart vector. A mathematical model was

developed for determining the spatial sensitivity of SQUID magnetometers for distributed current sources in infinite homogeneous volume conductors. The effects of the boundaries and inhomogeneities in a typical thorax on the lead fields were studied with model experiments. A new method based on the reciprocity theorem was developed for performing these experiments with two-dimensional heart-thorax models. It was found that the unipositional lead system meets the requirements for a clinical MCG lead system and is therefore suggested for use in determining the diagnostic performance of magnetocardiography. B.J.

A76-40127 **Jet lag isn't just a state of mind.** R. Rowan. *Fortune*, vol. 94, Aug. 1976, p. 140-145, 197, 198, 200, 202.

The symptoms and possible causes of circadian dysrhythmia - jet lag - are discussed. Circadian dysrhythmia manifests itself as physical fatigue coupled with irritability, a shortened attention span, decreased libido and increased anxiety. Other harmful effects of prolonged flights not properly classified as symptoms of jet lag are dehydration of the respiratory passageways and ocular fluids and relative hypoxia. The adjustment period varies with the length and direction of flight, and is of different duration for individual body rhythms. Among the possible remedies and preventatives for circadian dysrhythmia currently under investigation are flurazepam, lithium compounds, vitamins, and theophylline. C.K.D.

A76-40128 **Compositional nonrandomness - A quantitatively conserved evolutionary invariant.** R. Holmquist and H. Moise (California, University, Berkeley, Calif.). *Journal of Molecular Evolution*, vol. 6, Oct. 3, 1975, p. 1-14. 10 refs.

Statistical methods were applied to investigate the nonrandomness of 78 protein families comprising 169 individual proteins for which amino acid sequences have been reported in the literature. The quantity Q (Homquist, 1975), which has a direct physical interpretation as the number of amino acid residues per unit protein length in excess or deficit of that predicted from the genetic table normalized to a standard length of 100 residues, was adopted as a quantitative measure of overall nonrandomness. Results show that the probability that the amino acid composition of a protein will exhibit a given deviation from the genetic code table frequencies is the same for all protein families regardless of length, biological function, or species of origin. The standard deviation and mean of the probability distribution are stable about the values of 10 and 24, respectively. On the basis of this evidence, it is hypothesized that molecular evolution is the resultant of two coupled processes in balance, one selective and one stochastic. C.K.D.

A76-40129 * **Cyanogen induced phosphorylation of D-fructose.** Ch. Degani, M. Kawatsuji, and M. Halmann (Weizmann Institute of Science, Rehovot, Israel). *Journal of Molecular Evolution*, vol. 6, Oct. 3, 1975, p. 51-60. 32 refs. Grant No. NGR-33-006-070.

It has been demonstrated that a phosphorylated sugar, identified as alpha-D-fructopyranose, can be formed as the result of cyanogen-induced phosphorylation of D-fructose at pH 8.8. The product was isolated from barium and cyclohexylammonium salts and identified on the basis of its chromatographic and electrophoretic properties, its lability to hydrolysis by alkaline phosphatase, the rate of its acid-catalyzed hydrolysis, and the results of periodate oxidation and optical rotatory measurements. These results support the suggestion that the cyanogen-induced phosphorylation of free sugars could be a possible process for formation of sugar phosphates under prebiotic conditions (Halman et al., 1969). (Author)

A76-40130 * **On the origin of molecular 'handedness' in living systems.** H. P. Noyes and W. A. Bonner (Stanford University, Stanford, Calif.). *Journal of Molecular Evolution*, vol. 6, Oct. 29, 1975, p. 65-98. 21 refs. AEC-supported research; Grant No. NGL-05-020-582.

Elementary particle effects (beta-decay) provide only a weakly handed radiation in the biologically effective energy ranges. Global magnetic effects coupled to sunlight are randomized by paleomagnetic reversals. A persistent terrestrial handed bias at possible local biopoetic sites offers a more promising explanation for the origin of the 'handedness' of the molecules found among living systems on earth. Magnetite in lava flows maintains a handed bias for surface catalysis through many magnetic reversals. Indirect evidence for the hypothesis that magnetite contaminated with sulfur is a possible biopoetic site (Granick, 1957) has been provided by the molecular structure of ferredoxin - a single strand of the 14 primordial amino acids wrapped around an FeS core. Lava flows have been suggested as biopoetic sites by Fox (1964), since their temperature and chemical composition might allow for the rapid synthesis of prebiotic compounds at the surface of the primitive earth. The additional fact that magetite in lava flows also provides a persistent handed site for surface catalysis offers a further argument for the experimental investigation of this specific biopoetic environment. (Author)

A76-40131 **Crystallization and solid-state reaction as a route to asymmetric synthesis from achiral starting materials.** B. S. Green and M. Lahav (Weizmann Institute of Science, Rehovot, Israel). *Journal of Molecular Evolution*, vol. 6, Oct. 29, 1975, p. 99-115. 70 refs.

Many molecules which are achiral can crystallize in chiral (enantiomorphic) crystals and, under suitable conditions, crystals of only one chirality may be obtained. The formation of right- or left-handed crystals in excess is equally probable. Lattice-controlled (topochemical) photochemical or thermal solid-state reactions may then afford stable, optically active products. In the presence of the chiral products, achiral reactants may preferentially produce crystals of one chirality, leading to a feedback mechanism for the generation and amplification of optical activity. Amplification of optical activity can also be achieved by solid-state reactions. The optical synthesis of biologically relevant compounds by such routes may be envisaged. (Author)

A76-40132 * **Prebiotic peptide-formation in the solid state. II - Reaction of glycine with adenosine 5 prime-triphosphate and P1, P2-diadenosine-pyrophosphate.** H. Sawai, R. Lohrmann, and L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 6, Nov. 4, 1975, p. 165-184. 19 refs. NSF Grant No. GP-38774X; Grant No. NGR-05-067-001.

A76-40133 * **Prebiotic peptide-formation in the solid state. III - Condensation reactions of glycine in solid state mixtures containing inorganic polyphosphates.** H. Sawai and L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 6, Nov. 4, 1975, p. 185-197. 12 refs. NASA-supported research; NSF Grant No. GP-38774X.

A76-40134 * **The prebiotic synthesis of deoxythymidine oligonucleotides. II - Comparison of condensing agents.** D. G. Odom and J. T. Brady (U.S. Army, Letterman Army Institute of Research, San Francisco, Calif.). *Journal of Molecular Evolution*, vol. 6, Nov. 4, 1975, p. 199-207. 21 refs. NASA-supported research.

A reaction which oligomerizes nucleotides under possible prebiotic conditions has been characterized. Nucleoside monophosphate in the presence of cyanamide at acid pH condenses to form dithymidine pyrophosphate and phosphodiester bonded compounds. Imidazole compounds and activated precursors such as nucleoside triphosphate are not necessary for this oligomerization reaction which produces primarily cyclic oligonucleotides. (Author)

A76-40135 * **Compartmentalization of amino acids in surfactant aggregates - Partitioning between water and aqueous micellar sodium dodecanoate and between hexane and dodecylammonium propionate trapped water in hexane.** J. H. Fendler, F. Nome, and J. Nagyvary (Texas A & M University, College Station, Tex.). *Journal of Molecular Evolution*, vol. 6, Nov. 4, 1975, p. 215-232. 29 refs. NASA-supported research.

The partitioning of amino acids (glycine, alanine, leucine, phenylalanine, histidine, aspartic acid, glutamic acid, lysine, iso-

leucine, threonine, serine, valine, proline, arginine) in aqueous and nonaqueous micellar systems was studied experimentally. Partitioning from neat hexane into dodecylammonium propionate trapped water in hexane was found to be dependent on both electrostatic and hydrophobic interactions, which implies that the interior of dodecylammonium propionate aggregates is negatively charged and is capable of hydrogen bonding in addition to providing a hydrophobic environment. Unitary free energies of transfer of amino acid side chains from hexane to water were determined and solubilities of amino acids in neat hexane substantiated the amino acid hydrophobicity scale. The relevance of the experiments to prebiotic chemistry was examined. B.J.

A76-40136 * **Formation of nucleoside 5'-polyphosphates from nucleotides and trimetaphosphate.** R. Lohrmann (Salt Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 6, Dec. 29, 1975, p. 237-252. 25 refs. NASA-supported research; Grant No. NIH-GM-13435.

Nucleoside 5'-polyphosphates (N5PP) formed when solutions of nucleoside 5'-phosphates (N5P) and trimetaphosphate (TMP) are dessicated at room temperature are studied by paper chromatography, electrophoresis, and metal catalytic reactions. Divalent Mg ion exhibited superior catalytic function to other divalent metal ions in the reaction. Major reaction products are indicated. The importance of the N5PP series, TMP, and N5-triphosphate as substrates of RNA and DNA synthesis, and under postulated prebiotic conditions likely to obtain during prebiological ages of the earth, is emphasized and discussed. Alternate drying and wetting, evaporation from a prebiotic puddle, concentration of solubles in the remaining liquid phase, metal catalysis, and the role of these substances in the formation of amino acids and long-chain polyphosphates are considered. R.D.V.

A76-40137 **On the possible role of organic melanoidin polymers as matrices for prebiotic activity.** A. Nissenbaum, D. H. Kenyon, and J. Oro. *Journal of Molecular Evolution*, vol. 6, Dec. 29, 1975, p. 253-270. 50 refs.

A prebiotic evolutionary scenario centered around insoluble melanoidin polymers (condensation products of amino acids and sugars) as loci, prebiotic matrix, or template for some protobiotic reactions, and as alternative loci to inorganic surfaces, is developed. The relation of melanoidins to humic and fulvic acids and kerogens is demonstrated, and a function of melanoidins as primeval external electron acceptors in the prebiotic soup is argued. The presence of heterocyclic nitrogen compounds similar to the nitrogenous bases, the high concentration of stable free radicals, concentration of heavy metals playing prominent roles in contemporary enzymic redox processes, diagenetic cleavage of part of the melanoidin polymer (in conversion of humic acid to kerogen) liberating moieties with limited enzyme-like activity into the soup and interaction of these moieties with coacervate-like microscopic particles reminiscent of the melanoidins are emphasized in support of the scenario. R.D.V.

A76-40138 * **Aminoacyl transfer from an adenylate anhydride to polyribonucleotides.** A. L. Weber and J. C. Lacey, Jr. (Alabama, University, Birmingham, Ala.). *Journal of Molecular Evolution*, vol. 6, Dec. 29, 1975, p. 309-320. 22 refs. Grant No. NGR-01-010-001.

Imidazole catalysis of phenylalanyl transfer from phenylalanine adenylate to hydroxyl groups of homopolyribonucleotides is studied as a possible chemical model of biochemical aminoacylation of transfer RNA (tRNA). The effect of pH on imidazole-catalyzed transfer of phenylalanyl residues to poly(U) and poly(A) double helix strands, the number of peptide linkages and their lability to base and neutral hydroxylamine, and the nature of adenylate condensation products are investigated. The chemical model entertained exhibits a constraint by not acylating the hydroxyl groups of polyribonucleotides in a double helix. The constraint is consistent with selective biochemical aminoacylation at the tRNA terminus. Interest in imidazole as a model of histidine residue in protoenzymes participating in prebiotic aminoacyl transfer to polyribonucleotides, and in rendering the tRNA a more efficient adaptor, is indicated. R.D.V.

A76-40139 * **Reactions of aminomalononitrile with electrophiles.** J. W. Thanassi (Salk Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 7, Dec. 31, 1975, p. 65-73. 20 refs. Grant No. NsG-07021.

Aminomalononitrile (HCN trimer) reacts with electrophiles such as aldehydes and acrylonitrile under very mild conditions of temperature and pH to produce intermediates which, after acid hydrolysis, yield amino acids. The following amino acids have been identified and quantitated: glycine, D,L-erythro- and D,L-threo-beta-hydroxyaspartic acids, D,L glutamic acid, and D,L-threonine and allo-threonine. The mechanism of their formation and the possible significance of these reactions in prebiotic syntheses are discussed. (Author)

A76-40195 **Simulation of the respiratory control system.** H. T. Milhorn, Jr. (Mississippi, University, Jackson, Miss.; East Tennessee State University, Johnson City, Tenn.). *Simulation*, vol. 27, Aug. 1976, p. 169-172. 31 refs.

The development of computer models of the mammalian respiratory system over the last two decades is reviewed. Models discussed include those for CO2 inhalation, CO2 and O2 inhalation, perfusion of the cerebrospinal fluid and CO2 inhalation, and CSF perfusion, CO2 inhalation and O2 inhalation. Also discussed are models for CO2 inhalation, metabolic acidosis and metabolic alkalosis, Cheyne-Stokes respiration, phasic (breath-by-breath) air movement, and exercise. B.J.

A76-40198 **Renal handling of citrate during heat-induced hypocitricemia.** A. J. Gold and L. C. Costello (Howard University, Washington, D.C.). *American Journal of Physiology*, vol. 231, July 1976, p. 84-86. 18 refs. Research supported by the Andrew W. Mellon Foundation; Grant No. PHS-GM-17960.

A model of steady-state hypocitricemia, characterized by hypocitraturia and reduced kidney cortex citrate, has been demonstrated in the rat chronically exposed to environmental heat. The renal citrate extraction ratio remains unchanged. The physiological mechanism that brings about the reduction in circulating citrate has not been determined. Hypocitraturia likely results from a decreased filtered citrate load. Although it is generally contended that alkalosis increases and acidosis decreases renal excretion of citrate, observations of mild alkalosis and hypocitraturia during heat exposure suggest that factors other than pH can alter renal handling of citrate. Kidney mitochondrial function, as determined by in vitro measurements of citrate-stimulated respiratory rates and specific activities of isocitrate dehydrogenase, succinate dehydrogenase, malate dehydrogenase, and cytochrome c-oxidase, appears to be unaffected by environmental heat. (Author)

A76-40199 **Metabolic adaptations in brown adipose tissue of the hamster in extreme ambient temperatures.** T. Rabi and Y. Cassuto (Negev, University, Beersheba, Israel). *American Journal of Physiology*, vol. 231, July 1976, p. 153-160. 48 refs. Research supported by the University of Negev.

Experiments were conducted to evaluate the effect of cold and heat acclimation on the relative weight and composition of the brown adipose tissue (BAT) in adult male hamsters randomly divided into three groups maintained respectively for at least 21 days at 20 plus or minus 2 C, 5 plus or minus 1 C, and 35 plus or minus 1 C and then killed by decapitation and bled thoroughly. In cold acclimation, the relative weight of the BAT increased, its color grew dark, the multilocular structure was predominant, tissue protein content increased while fat content decreased, and the mitochondrial protein content increased. Opposite effects were observed in heat acclimation. In particular, cold acclimation was accompanied by increased tissue respiration in the presence of alpha glycerophosphate and succinate, whereas heat acclimation was found to reduce the respiratory activity of the tissue with these substrates. Differences in

the apparent activity of the mitochondria are suggested to be due to changes in mitochondrial conformation as a result of acclimation.
S.D.

A76-40200 **Hypothalamic and thalamic blood flow during somatic afferent stimulation in dogs.** P. Sandor, I. T. Demchenko, A. G. B. Kovach, and Y. E. Moskalenko (Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *American Journal of Physiology*, vol. 31, July 1976, p. 270-274. 34 refs. Grant No. NIH-NS-10939-01.

An experimental study was carried out to assess the effect of nociceptive somatic C fiber stimulation on regional cerebral blood flow of the thalamic ventral-posterolateral nucleus and the hypothalamic ventromedial nucleus as well as tissue available oxygen aO2 in anesthetized dogs at constant mean arterial blood pressure, P(CO2), and pH. Sciatic nerves were prepared on both sides to stimulate somatic afferent C fibers. Changes in the regions studied were compared to those in the white matter. The results indicate that local peripheral resistance increased and local blood flow decreased in each area studied under the action of prolonged ipsilateral sciatic nerve stimulation. Blood flow decreased more in the thalamic than in the hypothalamic area, and the smallest changes were observed in the white matter. Contralateral stimulation of the sciatic nerves caused a more moderate but likewise marked drop in regional cerebral blood flow and an increase in cardiovascular resistance in the white matter. Tissue aO2 in both areas decreased as compared to prestimulation level.
S.D.

A76-40224 # **Bioacoustics (Bioakustika).** V. D. Il'ichev, B. D. Vasil'ev, R. D. Zhantiev, V. R. Protasov, E. V. Romanenko, and G. N. Simkin. Moscow, Izdatel'stvo Vysshaia Shkola, 1975. 256 p. 86 refs. In Russian.

A series of lectures on bioacoustics is presented. Individual papers discuss acoustical orientation in organisms of different degrees of evolutionary advancement: nonvertebrates, fish, reptiles and amphibians, birds, and mammals. Bioacoustical divergence and interspecific signalling are examined, together with biological sonar systems.
C.K.D.

A76-40344 # **Psychical disturbances in cases of burns caused by electric current (Psychicke poruchy po popaleni elektrickym proudem).** P. Pavlovsky (Psychiatricka Klinika, Prague, Czechoslovakia). *Energetika*, vol. 26, Apr. 1976, p. 160, 161. 5 refs. In Czech.

Frequent problems encountered in post-accident psychic morbidity are examined in relation to causes of contact with live current, somatic and psychic pathological reactions of electric shock victims with extensive burns, and psychic morbidity during physical recovery. Four phases of the organism's reaction are delineated (initial shock; post-shock euphoria; severe depression and psychic complications aggravated by swamping of the organism by toxic substances due to tissue necrosis, loss of liquids, metabolic/circulatory/neurohumoral disorders; reconvalescence and attendant psychic stresses). Problems of reconvalescence affected by amputations, severe cosmetic alterations, impaired motions, work injuries, or social isolation are considered. Injuries to brain tissue and electroencephalopathies, are also discussed, in addition to on-the-job safety.
R.D.V.

A76-40345 # **Hearing protectors for workers in energy plants (Ochranne sluchove pomucky v energetickych provozech).** V. Kambersky (Energoinvest, Prague, Czechoslovakia). *Energetika*, vol. 26, Apr. 1976, p. 169-172. In Czech.

Noise levels around different types of industrial machinery are listed in line with the 1967 Ministry of Public Health standard on noise levels and noise abatement. Varieties of on-the-job hearing protection devices are described and noise attenuation graphs are displayed for the main types. The discussion covers: devices plugging the auditory passages (glass cloth and plastic ear protectors, resonant ear protectors), noise-silencing ear muffs with different types of padding and clamping, antinoise hoods and helmets. The antinoise helmets and hoods, and some protectors in use in East Germany, provide 30-40 dB attenuation above 4000 Hz.
R.D.V.

A76-40460 # **Application of statistical modeling to the investigation of the activity of the operator in man-machine automatic control system complexes (K voprosu issledovaniia deiatel'nosti operatora v cheloveko-mashinnykh kompleksakh ASU s primeneniem metoda statisticheskogo modelirovaniia).** Zh. K. Chuvakov. *Teoriia Kodirovaniia i Informatsionnoe Modelirovanie*, no. 2, 1975, p. 192-196. 8 refs. In Russian.

A76-40575 # **Effects of exercise-induced stress on platelet aggregation.** R. Levites (U.S. Veterans Administration Hospital, Bronx, N.Y.) and J. I. Haft (Mount Sinai School of Medicine, New York, N.Y.). *Cardiology*, vol. 60, no. 5, 1976, p. 304-314. 26 refs.

Platelet aggregation studies were conducted before and after a double two-step Master test in 19 patients with predominant angina pectoris aged 35-60 yr and in 19 normal controls aged 25-65 yr. The response of platelet-rich plasma to 0.1, 1, and 10 micro-M of ADP and 1 and 10 micro-M of epinephrine was tested in a chrono-log aggregometer. No significant differences in the number of biphasic responses (irreversible aggregation) to the several concentrations of aggregating agents were observed at rest between the two groups. Following exercise, differences between the two groups became apparent. While among controls the number of biphasic responses before and after exercise remained essentially unchanged, the number of biphasic responses in patients with coronary artery disease increased markedly after exercise, with statistically significant difference between the two samples. It is concluded that exercise increases significantly the tendency of platelets to aggregate among patients with coronary artery disease, probably related to myocardial infarction during stress.
S.D.

A76-40627 **Control and modeling of physiological processes (Upravlenie fiziologicheskimi protsessami i ikh modelirovanie).** Edited by V. N. Chernigovskii. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 31), 1975. 312 p. In Russian.

The present collection of papers is concerned with such key problems of space biology as modeling of the vestibular system and control of locomotions, regulation of blood circulation, modeling of alveolar gas exchange, and biophysics of photosynthesis. Physico mathematical approaches are used to solve biological problems in conjunction with experiemntal physiological and biophysical investigations of processes taking place in humans and animals as well as in isolated biological objects. Featured topics include physical modeling of the system of semicircular canals in man, characteristics of muscle control during stabilization and rhythmic activity, investigation of cerebrospinal reflexes, and quantum electronic approach to study the initial stage of photosynthesis.
S.D.

A76-40628 # **Response of the hydrodynamically interacting semicircular canals to an adequate stimulus (Reaktsiia gidrodinamicheski vzaimodeistvuiushchikh polukruzhnykh kanalov na adekvatnyi razdrazhitel').** I. Iu. Sarkisov (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 7-14. 14 refs. In Russian.

Requirements of modern air and space flights has made it necessary to study the vestibular responses caused by the action of different angular velocities on the semicircular canals. The paper describes a mathematical model for the system of hydrodynamically interacting semicircular canals in the human ear, with particular reference to the response of this system to an adequate stimulus. The model proposed by Steinhausen (1933) - which reflects the processes taking place in an isolated canal - is only applicable in a first approximation to describe the entire response of the system of three semicircular canals in a natural labyrinth. The discussion is limited to the left complex of semicircular canals. A matrix of interaction coefficients is derived which shows that the effect of the flows of the endolymph in the vertical canals on the deviation of the cupula of the horizontal canal is either absent or negligible.
S.D.

A76-40629 # **Results of physical modeling of the system of semicircular canals in man - Functioning of the vestibular apparatus during oscillations of the head (Rezul'taty fizicheskogo modelirovaniia sistemy polukruzhnykh kanalov cheloveka - Funktsionirovanie vestibuliarnogo apparata pri ostsilliatsiiakh golovy).** S. V. Petukhov (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Mashinovedeniia, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 14-64. 79 refs. In Russian.

The paper is concerned with advances in obtaining exact information about the dynamics of labyrinth processes in the vestibular system and in establishing correlations between these processes and vestibular reactions of the human body. These advances are achieved by creating a scale model of the system of semicircular canals which is capable of reproducing the dynamics of natural labyrinth processes in suitable conditions of physical experimentation. The development of such scale models is based on likelihood criteria for the processes in the vestibular labyrinth, which are derived on the basis of the theory of dynamic likelihood. Necessary information on the structure of the semicircular canals and well-known attempts at their physical modeling are reviewed. Results are presented for model experiments in the study of the dynamics of the motion of the cupulae of semicircular canals for certain types of rotation of the head. S.D.

A76-40630 # **Moments at joints during human walking and the problem of maintaining equilibrium (O sustavnykh momentakh pri khod'be cheloveka i zadache podderzhaniia ravnovesiia).** T. I. Shtil'kind (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 64-119. 18 refs. In Russian.

The paper outlines a model for computer-aided calculation of the moments of internal forces acting at the joints in human legs during walking and a model for maintaining equilibrium and controlling human motion. The model describing the plane motion of legs during locomotion makes it possible to determine, by solving a pertinent inverse problem of mechanics, the moments at the leg joints irrespective of the body kinematics. The stabilization of the equilibrium model in the case of delay in the feedback loop is discussed. S.D.

A76-40631 # **Investigation of the characteristics of muscle control during stabilization and rhythmic activity (Issledovanie osobennostei upravleniia myshtsami v rezhime stabilizatsii i ritmicheskoi aktivatsii).** T. B. Kireeva (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 119-134. 6 refs. In Russian.

Electromyographic experiments were conducted on seven healthy subjects and six patients with Parkinson's disease to elucidate differences and general trends in the organization of the control of rhythmic movements and stabilization of exerted force. Attention is focused on the investigation of the effect of variation in afference on both regimes of muscular activity. It is shown that a change in afference has a strong effect on static muscular activity, whereas rhythmic activity is far less sensitive to change in afference. External forces have an almost identical effect on static or rhythmic muscular activity both during voluntary activation in the healthy subjects and during involuntary activation in the patients considered. S.D.

A76-40632 # **Investigation of cerebrospinal reflexes - A review of the concept of bulbar vasomotor center (Issledovanie spinnomozgovykh vazomotornykh refleksov - K kritike kontseptsii bul'barno sosudodvigatel'nogo tsentra).** E. V. Lukoshkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 135-157. 64 refs. In Russian.

Electrophysiological experiments were conducted on anesthetized cats under conditions of artificial breathing in order to determine the level of switching the impulses of afferent fibers of cerebrospinal nerves to preganglionic neurons involved in the sympathetic innervation of the heart and vessels. The discussion covers the reflex responses of the cardiovascular system and bioelectrical activity of sympathetic nerves; identification of the afferent fibers of spinal nerves, which elicit, in the animals with intact brain, vasomotor reflexes and responses in sympathetic nerves; spinal closing of the arcs of vasomotor reflexes relative to reflexes induced by stimulation of mesenteric and somatic nerves; and possible causes of attenuation and fadeout of reflex responses in spinal specimens. Some functions of the bulbar vasomotor center are discussed. S.D.

A76-40633 # **Investigation of causes of orthostatic instability (Izuchenie prichin ortostaticheskoi neustoichivosti).** L. L. Shik, K. A. Sergeeva, and V. A. Moiseev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 157-164. 9 refs. In Russian.

Results are presented for experiments on healthy subjects and patients with primary and secondary varicose dilatation, subjected to a modified orthostatic test, in order to assess the significance of impairment in the capacity and stiffness of the veins in the lower limbs, efficiency loss in the mechanism of limiting the arterial inflow due to constriction of resistive vessels, noncontraction of skeletal muscles of the limbs, and disorders in vasomotor regulation. Patients with damaged spinal cord were also tested. Both groups of patients with varicose dilatation exhibitied loss of muscular tonus in the lower limbs as well as their paralysis. Decrease of vasomotor regulation and not of motor innervation of skeletal muscles is the dominant factor accounting for sharp disorders in orthostatic stability. Efficiency loss in constrictional responses of resistive vessels of the lower limbs appears to be less significant. Paralysis of the skeletal muscles of the lower limbs is not a decisive factor in sharp disorders of orthostatic stability occurring during damages to the spinal cord. S.D.

A76-40634 # **Investigation of the mechanical parameters of fine blood vessels (Issledovanie mekhanicheskikh parametrov melkikh krovenosnykh sosudov).** A. N. Rogoza (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 165-176. 27 refs. In Russian.

Prolonged hypotony due to weightlessness may result in serious changes in the state of the vascular bed in man. A resistographic technique is proposed for analyzing the mechanics of fine arteries with diameter less than 1 mm. A test facility is designed which permits maintaining for several hours the working capacity of an isolated artery and carrying out its chemical or electrical stimulation, recording the behavior of the hydraulic conductivity of a vessel, and measuring the outer radius and length of a vessel under stationary conditions (3% accuracy). A preliminary analysis of results reveals that the method of resistography is suitable for analyzing vessel wall elasticity and that the mechanical parameters thus determined agree reasonably well with data obtained by other workers. S.D.

A76-40635 # **Role of diffusion in intrapulmonary mixing of gases (Rol' diffuzii vo vnutrilegochnom smeshenii gazov).** L. A. Sidorenko and L. L. Shik (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 177-190. 20 refs. In Russian.

There is enough evidence to complement the classical concepts on the mechanism of pulmonary ventilation with the decisive role of intrapulmonary diffusion in the passage of atmospheric air to the remote regions of the tracheobronchial tree and alveoli. Proofs pertaining to the role of intrapulmonary mixing of gases are discussed in terms of morphological data, model concepts, and experimental findings. The classical concepts are found to be insufficient as they claim that the only reason of alveolar ventilation is the flow of inspired air produced by the physical work of respiratory muscles. There is no doubt that the propagation of

inspired air to the end sections of the bronchial tree and directly to the alveoli takes place through diffusion. The dead space may be regarded as consisting of the anatomical dead space and of an additional component resulting from layered inhomogeneities in the pulmonary system. S.D.

A76-40636 # **Effect of pressure and composition of gaseous medium on PO2 and pCO2 gradients between mixed alveolar air and arterial blood (Vliianie davleniia i sostava gazovoi sredy na gradienty pO2 i pCO2 mezhdu smeshannym al'veoliarnym vozdukhom i arterial'noi krov'iu).** V. P. Nikolaev and V. G. Shabel'nikov (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 191-216. 40 refs. In Russian.

The paper is concerned with the theoretical analysis of the mechanisms underlying the influence of pressure and composition of a gaseous medium on the process of O2 and CO2 transport between the lungs and blood. Particular attention is devoted to the mathematical model of gas exchange between the lungs and blood and to the losses in O2 and CO2 tensions during the diffusion of these gases in the alveolar space of the lungs. The alveolo-arterial difference pO2 and the arterio-alveolar difference pCO2 are presented as the sum of five different components. Such an approach permits solution of a wide variety of problems in respiratory physiology and, in particular, differentiation of the effect of physiological and physical factors on the transport of gases between the lungs and blood. Illustrative examples are provided. S.D.

A76-40637 # **Role of the alveolar ventilation/perfusion line in a periodically ventilated lung model (Rol' 'linii dV sub A/dt/dQ/dt' v periodicheskii ventiliruemoi modeli legkikh).** V. G. Shabel'nikov (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 216-234. 20 refs. In Russian.

The paper presents a qualitative analysis of a mathematical model for gas exchange in the lungs ventilated by periodical changes of their volume. The analysis made it possible to obtain a more precise definition of the degree of applicability of the concepts of ideal alveolar gas and line of alveolar ventilation/perfusion relationships for describing the transport of gases in real lungs. It is shown that the alveolar point which reflects the composition of air in a lung unit moves always to its state of stable equilibrium. The continuously ventilated lung model demonstrates the particular case or alveolar-point trajectories - i.e., the equilibrium state in the inhaling phase. S.D.

A76-40638 # **Quantum electronic approach to study the initial stage of photosynthesis (Kvantovoelektronnyi podkhod k izucheniiu pervichnoi stadii fotosinteza).** E. M. Trukhan (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 235-256. 36 refs. In Russian.

The characteristics of the light-induced stage of photosynthesis of leaves and algae are analyzed in the light of solid state physics. Requirements to be met by a quantum electronic model for the initial stage of photosynthesis are formulated. Properties of p-n transition are theoretically examined as a basis for a possible model of generation of reduction potential in a natural and artificial photosynthetic system. It is shown that a simple electron-hole transition can hardly be used as a model for a natural system. Perspective of studying a model with the cooperation of excitation quanta is noted. S.D.

A76-40639 # **Experimental investigation of the physical characteristics of the initial stage of photosynthesis (Eksperimental'noe issledovanie fizicheskikh kharakteristik pervichnoi stadii fotosinteza).** E. M. Trukhan, V. N. Deriabkin, and V. B. Kireev (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 256-272. 31 refs. In Russian.

There is presently no common agreement about the physical mechanism responsible for the conversion of luminous energy into chemical potential representing the prime mover of CO2 reduction in photosynthesis of plants. The paper is concerned with an experimental study of the luminescence, photoconductivity, and rate of oxygen release upon exposure of certain plant leaves to light. A brief description is given of the measuring facilities used. Experimental results are compared with available published data on the extent of photosynthetic action on the biomass of plants. S.D.

A76-40640 # **A cooperative model for the first stage of photosynthesis (Ob odnoi kooperativnoi modeli pervichnoi stadii fotosinteza).** E. M. Trukhan and V. B. Kireev (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 273-293. 21 refs. In Russian.

The paper analyzes the cooperation of light quanta through an intermediate excited level of energy for the development of a possible model for a photosynthetic system. Attention is focused on the possibilities of the cooperation of quantum energy for constructing the theoretical model of the initial stage of photosynthesis in higher plants and green algae. Basic experimental properties of photosynthesizing systems are formulated. The proposed theoretical model for the cooperation of excitation quanta in the luminous stage of photosynthesis is based on second excited state. A mathematical analysis shows that the model meets the formulated experimental requirements. S.D.

A76-40641 # **Kinetics of oxygen release from single-cell algae (Kinetika vydeleniia kisloroda odnokletochnymi vodorosliami).** A. N. Asanov (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). In: Control and modeling of physiological processes. Moscow, Izdatel'stvo Nauka, 1975, p. 293-310. 29 refs. In Russian.

Photosynthesis in plants is discussed in terms of photooxidation, photoreduction, and photophosphorylation. The rate of oxygen release reflects the course of the whole luminous stage of photosynthesis. The rate of oxygen release in chlorella pyrenoidosa, Anacystis, and Kirchneriella obesa is studied experimentally by the method of modulated amperometry. The kinetics of oxygen release after the period of darkness is discussed along with a model for a photosynthetic unit where the semiconducting properties of chlorophyll play a key role in photosynthesis. S.D.

A76-40712 **Interactive graphics in the analysis of neuronal spike train data.** R. J. Sclabassi, R. Buchness, and T. Estrin (California, University, Los Angeles, Calif.). *Computers in Biology and Medicine*, vol. 6, July 1976, p. 163-178. 22 refs. Grants No. PHS-NS-02501; No. NIH-FR-3.

The paper outlines an interactive graphics system used in the modeling and analysis of neuronal spike-train data recorded from single nerve cells. In particular, the application of a multiprocessor graphics system to one formulation of the microscopic identification problem in neurophysiology is discussed. The observed experimental spike-train data are characterized as a stochastic point process, and the analytical techniques available to investigate the dependency structure of the data are reviewed. The graphics system developed for this study employs three separate computers, allowing for efficient distribution of tasks between elements in the multiprocessor network. The interactive graphics program is structured as a resident executive with a number of phases available for overlay at execution. The major phases include data base generation, modeling, optimization, data processing, and validation. The implications of the use of interactive graphics in support of studies of this type are discussed. S.D.

A76-40713 **Digital archiving of biomedical recordings for off-line computer analysis.** W. K. Harrison and K. M. Bakalar (Johns Hopkins University, Baltimore, Md.). *Computers in Biology and Medicine*, vol. 6, July 1976, p. 191-198. Grants No. NIH-HL-14928; No. NIH-HL-16907.

This article describes a new procedure for archiving biomedical recordings on industry standard digital magnetic tape. Familiar computer methodology is employed for data-banking heartbeat patterns in a format which has been optimized for later analysis. Recordings are made through an encoder-controller unit coupled to a four channel FM cassette data recorder. This unit produces FM analog magnetic tape with square wave identification and calibration code preceding each sample of biomedical data. Code bits and data sample are timed out sequentially in repetitive standardized format. Digital images of these specially formatted analog tape cassettes are then processed by an edit program on an IBM 370/145. Here, the identifiers are decoded and data sections located. Identification, calibration, and biomedical recordings are then archived on a directory tape which may be efficiently and repeatedly accessed for future computations. (Author)

A76-40752 **Electromagnetic field effects in nerve tissue.** S. S. Sandler (Northeastern University, Boston, Mass.) and G. S. Smith (Harvard University, Cambridge, Mass.). In: Electromagnetic compatibility; Proceedings of the First Symposium and Technical Exhibition, Montreux, Switzerland, May 20-22, 1975.
New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 393-395. NSF Grant No. GK-40575.

In the present work an attempt has been made to correlate structural alterations in tissue from the nervous system of leopard frogs with the specific local electric field intensity in the tissue. The local field used for the exposures was composed of a train of high intensity sub-nanosecond pulses with a low repetition rate. These pulses provide a high electric field intensity in the tissue yet a low enough absorbed energy to cause negligible thermal heating. A special coaxial exposure chamber was used to hold tissue removed from the freshly killed frogs while it was exposed to the pulsed field. The coaxial geometry permits accurate determination of the local electric field in the tissue. The exposed tissue and control tissue from the same animal were simultaneously prepared for microscopic investigation. (Author)

A76-40757 **Electromagnetic compatibility /EMC/ as a determining factor in biological effects caused by electric and magnetic fields.** W. E. Cory (Southwest Research Institute, San Antonio, Tex.) and C. L. Frederick. In: Electromagnetic compatibility; Proceedings of the First Symposium and Technical Exhibition, Montreux, Switzerland, May 20-22, 1975.
New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 469-474. 15 refs.

This paper defines the state of electromagnetic compatibility in terms of the electrical intrinsic impedance of the whole body and its systems and organs, for example, the peripheral nervous system, blood, brain, thyroid, thymus, hypothalamus, adrenal glands, pituitary gland, and reproductive organs. Included is a discussion of the experimental and theoretical basis for certain observed biological effects in terms of the state of electromagnetic compatibility between the exposed organism and the electrical field existing in the environment. (Author)

A76-40885 * **Nocturnal lowering of thresholds for sweating and vasodilation.** C. B. Wenger, M. F. Roberts, J. A. J. Stolwijk, and E. R. Nadel (Yale University, New Haven, Conn.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 15-19. 26 refs. Grants No. NIH-ES-00123; No. NIH-ES-00354; No. NsG-9023.

The effect of the time of day on the relation of the heat-dissipating responses (sweating and vasodilation) to esophageal and mean skin temperatures was investigated. These parameters were measured in six subjects exercised at 60-70% of maximal aerobic power in a 25 deg C ambient. Results indicate that a circadian rhythm in the thresholds for sweating and vasodilation can account for much of the rhythm of internal body temperature. The circadian rhythm in the operation of the thermoregulatory system seems to be expressed through a reference point shared by vasomotor and sudomotor controls. C.K.D.

A76-40886 **Plasma renin, angiotensin II, and plasma and urinary aldosterone in running exercise.** K. J. Kosunen (Helsinki, University, Helsinki, Finland) and A. J. Pakarinen (Meilahti Hospital, Helsinki, Finland). *Journal of Applied Physiology*, vol. 41, July 1976, p. 26-29. 21 refs. Research supported by the Ministry of Education of Finland.

A76-40887 **Systolic time intervals during +Gz acceleration.** T. B. Graboys and E. D. Michaelson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 52-56. 18 refs.

The feasibility of using systolic time intervals (STI) as a noninvasive means of studying cardiac function during positive vertical acceleration was investigated. The STI of subjects was monitored before, during, and after 30-sec exposures to +3, +5, and +7 G. Prolongation of the heart rate (HR) corrected electromechanical systole interval, left ventricular ejection time (LVET), pre-ejection period and PEP/LVET was observed within the first five seconds of exposure to positive acceleration. The effects of positive acceleration on stroke volume and cardiac output were estimated using previously reported relationships between invasively determined parameters and STI. Although STI can be successfully measured at high positive G, it is concluded that extrapolation of these measurements to invasively derived parameters of left ventricular function should be viewed cautiously. C.K.D.

A76-40888 **Threshold temperatures for shivering in acute and chronic hypercapnia.** K. E. Schaefer and W. Wünnenberg (Yale University, New Haven, Conn.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 67-70. 9 refs.

A76-40889 **Effect of angiotensin on hypoxic pulmonary vasoconstriction in isolated dog lung.** J. M. Alexander, M. D. Nyby, and K. A. Jasberg (California, University, Los Angeles; U.S. Veterans Administration Hospital, Sepulveda, Calif.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 84-88. 29 refs.

A76-40890 **Alkaline shift in lumbar and intracranial CSF in man after 5 days at high altitude.** R. B. Weiskopf (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.), R. A. Gabel (Peter Bent Brigham Hospital, Boston, Mass.), and V. Fencl (Harvard University, Boston, Mass.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 93-97. 22 refs.

A76-40891 **A new method to determine frequency characteristics of the respiratory system.** F. J. Landser, J. Nagels, M. Demedts, L. Billiet, and K. P. van de Woestijne (Academisch Ziekenhuis, Leuven, Belgium). *Journal of Applied Physiology*, vol. 41, July 1976, p. 101-106. 10 refs.

A technique is described allowing one to determine simultaneously the resistance and reactance of the total respiratory system for various frequencies. During spontaneous breathing, regularly recurring impulses are produced at the mouth by means of a loudspeaker. A Fourier analysis of the mouth pressure and flow signals yields mean resistance and reactance values, over 16 s, for all harmonics of 2 Hz up to 30 Hz. The values are in good agreement with those obtained in the absence of breathing and those determined by means of the forced oscillation technique and by body plethysmography. The reproducibility of the measurements is satisfactory (coefficient of variation: 11.6%). (Author)

A76-40892 * **Implantable electrode for recording nerve signals in awake animals.** I. Ninomiya (Hiroshima University, Hiroshima, Japan), Y. Yonezawa (Hiroshima Institute of Technology, Hiroshima, Japan), and M. F. Wilson (West Virginia University, Medical Center, Morgantown, W. Va.). *Journal of Applied Physiology*, vol. 41, July 1976, p. 111-114. 7 refs. Ministry of Education of Japan Grant No. 021514; Grant No. NGR-49-001-048.

An implantable electrode assembly consisting of collagen and metallic electrodes was constructed to measure simultaneously neural signals from the intact nerve and bioelectrical noises in awake animals. Mechanical artifacts, due to bodily movement, were negligibly small. The impedance of the collagen electrodes, measured in awake cats 6-7 days after implantation surgery, ranged from 39.8-11.5 k ohms at a frequency range of 20-5 kHz. Aortic nerve activity and renal nerve activity, measured in awake conditions using the collagen electrode, showed grouped activity synchronous with the cardiac cycle. Results indicate that most of the renal nerve activity was from postganglionic sympathetic fibers and was inhibited by the baroceptor reflex in the same cardiac cycle. (Author)

A76-40947 * **Tissue catecholamine levels of the golden hamster /Mesocricetus auratus/ acclimated to 7, 22 and 34 C.** S. B. Jones and X. J. Musacchia (Missouri, University, Columbia, Mo.). *Comparative Biochemistry and Physiology*, vol. 52C, 1975, p. 91-94. 22 refs. Research supported by the University of Missouri; Grant No. NGR-26-004-021.

A76-40985 # **Life and the outer planets. I - Performance of terrestrial organisms in ammonia-rich systems.** S. M. Siegel (Hawaii, University, Honolulu, Hawaii). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 9 p. 15 refs.

Survival and growth of organisms has been demonstrated at 298 K in NH3 atmospheres, including NH3-CH4 mixtures. Included are bacteria (Clostridium and Pseudomonas) and fungi (Penicillium and Torula). A distinctive discovery of possible pre-Cambrian affinities, Kakabekia barghoorniana, developed in NH3-saturated aqueous media at 267 K. Although in Allium species the biological response is limited to germination, standard metabolic poisons were active even in 15 M aqueous NH3 at 250 K. The most extreme example of compatibility between NH3-rich environments and terrestrial life was the retention of metabolic capabilities by conidia of Penicillium after 6 months at 233 K in a liquid ammonia-glycerol medium. Tritiated thymidine, uridine and amino acids were incorporated by these conidia unless subjected to intense gamma-radiation. Observations suggest that the analogies between H2O and NH3 as solvent media or -OH and -NH2 as functional groups are probably valid, and that chemical-biological evolution not unlike the early terrestrial could be compatible with chemical conditions presumed to exist on the outer planets and some of their satellites. (Author)

A76-40986 # **Life and the outer planets. II - Enzyme activity in ammonia-water systems and other exotic media at various temperatures.** S. M. Siegel and T. Speitel (Hawaii, University, Honolulu, Hawaii). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 10 p. 12 refs.

Enzyme activities are customarily measured in aqueous solutions. Activity and thermodynamic parameters are based upon behavior in these solutions, although they in no way represent the highly structured internal surface system of the cell. It would, therefore, not be surprising if the actual environmental limits for enzyme action were in some cases greater than those generally assumed. Several enzymes retain activity in drastically modified aqueous and nonaqueous media, including aprotic solvents. Examples include formic acid, methanol, formamide, nitromethane, 10 molal LiCl and 15 molar aqueous ammonia. Temperatures as low as 225-233 K permit activity in some media. Included are peroxidase, catalase, urease, and amylase. Ammonia-rich environments are compatible with some forms of terrestrial life, but the demonstration of biocatalyst activity in these exotic media and conditions is relevant to chemical evolution on Jupiter and similar planetary systems. (Author)

A76-41120 * **Amino acid precursors in lunar fines - Limits to the contribution of jet exhaust.** S. W. Fox, K. Harada (Miami, University, Coral Gables, Fla.), and P. E. Hare (Carnegie Institution of Washington, Washington, D.C.). *Geochimica et Cosmochimica Acta*, vol. 40, Sept. 1976, p. 1069-1071. 25 refs. Grant No. NGR-10-007-088.

A sample of lunar fines collected at a maximum distance, 6.5 km, from the descent engine on Apollo 17 has been analyzed for total amino acids obtainable by hydrolysis of aqueous extracts. The minimum amounts of amino acids, calculated for a disk of 6 km radius are 10,000 to 100,000 times those which could be contributed by the lunar module jet exhaust, on the basis of conservatively limiting assumptions. The amino acids thus obtained are not explainable as due to chemical or biological contamination; their source is accordingly inferred as lunar. Under the conditions of hydrolysis of lunar extracts, cyanide is found to be converted, almost exclusively to glycine, to an extent of 0.0001. (Author)

A76-41124 **Avoidance of radiation hazards from microwave antennas.** D. H. Shinn. *Marconi Review*, vol. 39, 2nd Quarter, 1976, p. 61-80. 9 refs.

Powerful microwave radiation can initiate fires and explosions and may also be harmful to biological systems. Consequently, near some microwave antennas there may be regions which are hazardous for people, refuelling and so on. Precautions are always to be taken to prevent access or refuelling in these regions while the hazardous power level is present. A graphical method is presented for determining the boundaries of these hazardous regions, given the peak power and mean power radiated, and the size and gain of the antenna. As examples, a tropospheric scatter communications installation and a radar height finder are treated in detail; and it is indicated how such hazards can be avoided. (Author)

A76-41142 * **Observations on autoregulation in skeletal muscle - The effects of arterial hypoxia.** G. M. Pohost, J. B. Newell, N. P. Hamlin, and W. J. Powell, Jr. (Massachusetts General Hospital, Harvard University, Boston, Mass.). *Cardiovascular Research*, vol. 10, July 1976, p. 405-412. 13 refs. NASA-supported research; Grant No. NIH-HL-06665.

An experimental study was carried out on 25 mongrel dogs of both sexes to re-evaluate autoregulation of blood flow in skeletal muscle, with particular reference to the steady-state resistance and transient response in muscle blood flow following a square wave increase in arterial perfusion pressure and to the examination of the effect of arterial hypoxia on this transient response. The data emphasize the importance of considering the transient changes in blood flow in evaluating the autoregulatory response in skeletal muscle. For quantification purposes, a parameter termed alpha is introduced which represents the ratio between the increase in blood flow from baseline to peak and the return of blood flow from the peak to the new steady-state. Such a quantification of the transient response in flow with step increases in perfusion pressure demonstrates substantial transient responses under conditions of normal oxygenation and progressive attenuation of flow transients with increasing hypoxia. S.D.

A76-41143 **Simultaneous measurement of cardiac output and its distribution with microspheres in the rat.** D. G. McDevitt (Vanderbilt University, Nashville, Tenn.) and A. S. Nies. *Cardiovascular Research*, vol. 10, July 1976, p. 494-498. 18 refs. Grant No. PHS-GM-15431.

A76-41201 **Effects of electrical stimulation in the lower brainstem on temperature regulation in the unanaesthetized guinea-pig.** Z. Szelenyi, E. Zeisberger, and K. Brück (Giessen, Universität Giessen, West Germany). *Pflügers Archiv*, vol. 364, no. 2, 1976, p. 123-127. 23 refs. Deutsche Forschungsgemeinschaft Grant No. SFB-122.

A76-41202 **Responses of midbrain raphe neurons to local temperature.** T. Hori and Y. Harada (Kumamoto University, Kumamoto, Japan). *Pflügers Archiv*, vol. 364, no. 2, 1976, p. 205-207. 15 refs.

The effect of heating and cooling in the midbrain on the unit activities of midbrain raphe neurons in the rat was observed. Out of 24 raphe units studied, 14 units responded to a rise in midbrain

temperature with an increased rate of firing. The remaining 10 units did not respond to temperature changes between 34 and 41 C. The result is consistent with the idea that the heat-induced increase in brain serotonin turnover is mediated by an increased firing rate of midbrain raphe neurons. (Author)

A76-41321 **Motion information in iconic memory.** P. Demkiw and C. F. Michaels (Lake Forest College, Lake Forest, Ill.). *Acta Psychologica*, vol. 40, Aug. 1976, p. 257-264. 10 refs.

Motion perception was investigated in two experiments using Sperling's partial report procedure. In Experiment 1, subjects were presented with 8 moving squares; at array offset an arrow cued subjects to locate all squares moving in the direction of the arrow. The partial report was found to be superior to the whole report and this was taken as evidence for the existence, in iconic memory, of information about the direction of motion. The second experiment revealed only a minor decay in this superiority with the indicator delayed up to 1 sec. The importance of optical transformations in vision was stressed and it was argued that information processing models need pay greater attention to them. (Author)

A76-41322 **Effect of information feedback upon intertrial consistency of time judgment.** R. E. Hicks (New York, State University, Albany, N.Y.). *Acta Psychologica*, vol. 40, Aug. 1976, p. 265-270. 14 refs.

Groups of subjects making verbal estimations of time intervals without information feedback (IF) about errors produced an intertrial correlation matrix with a well defined superdiagonal form, while those with IF did not. IF appeared to affect the subjects' response criteria rather than their sensitivity to stimulation, and the behavior of these subjects can be interpreted within the context of either the complication or the simplification hypothesis (Jones, 1969). However, neither of these hypotheses satisfactorily accounts for the progressive underestimation of time intervals by subjects without IF, and it is suggested that an interpretation based on changing processes underlying judgments is more appropriate for this group. C.K.D.

A76-41323 **Elimination by aspects as a decision rule for risky choice.** R. H. Ranyard (Bolton Institute of Technology, Bolton, Lancs., England). *Acta Psychologica*, vol. 40, Aug. 1976, p. 299-310. 16 refs.

The elimination by aspects model (Restle, 1961; Tversky, 1972), in which choice alternatives are represented as collections of valued aspects, was tested in risky choice trials consisting of duplex gambles in which valued aspects were assumed to be explicit probabilities and payoffs. Substantial violations of two of the three consequences of the elimination by aspects model which were tested were found; these may have been the result of interactions between explicit aspects to give new aspects. It is concluded that the model is valid for explicit aspects only when these aspects are independent. C.K.D.

A76-41324 **The effects of adaptation to stereoscopic depth and to uniocular image magnification on the duration of short-term visual storage.** H. C. van der Meer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Acta Psychologica*, vol. 40, Aug. 1976, p. 311-323. 53 refs.

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N76-28804 California Univ., Berkeley
ENZYMES IN HETEROGENEOUS SYSTEMS Ph.D. Thesis
Alan James Benesi 1975 165 p
Avail: Univ. Microfilms Order No. 76-15110

Investigations involving enzymes in heterogeneous systems were undertaken: (1) experiments in which papain activity was used as a microenvironmental redox meter demonstrated that the redox potential in the vicinity of a charged interface can be significantly different than that of the bulk solution when the redox agents bear unlike charges; (2) a theoretical mathematical treatment of residence times of molecules in columns was used to demonstrate that the phenomenon of convective dispersion increases the average residence time of molecules in a column; (3) a simple experimental investigation of the dependence of apparent soil enzyme activity on soil particle size clearly demonstrated that diffusion can limit observed soil enzyme reaction rates; and (4) experiments with a mitochondrial membrane enzyme malate dehydrogenase revealed that nonionic detergent micelles double observed first-order reaction rates (and lower the affinity constant by a factor of 2). Dissert. Abstr.

N76-28805 Arizona Univ., Tucson.
THE SYNTHESIS OF SPECIFICALLY DEUTERATED AMINO ACIDS AND PERTIDES FOR USE IN BIOPHYSICAL STUDIES Ph.D. Thesis
Donald Allen Upson 1975 126 p
Avail: Univ. Microfilms Order No. 76-14547

The synthesis is reported of specifically deuterated S-benzyl cysteine derivatives deuterated in the alpha position only, the beta position only, and in the alpha and beta positions simultaneously. These compounds were used to introduce specifically deuterated cysteine into the neurohypophyseal hormones oxytocin and [8-arginine] vasopressin at the 1-hemi- or the 6-hemi-cystine positions. Also reported is the synthesis of alpha deuterated isoleucine and its inclusion into the 3 position of oxytocin. In addition to the deuterated hemi-cystine derivatives of [8-arginine] vasopressin, alpha deuterated phenylalanine was synthesized and incorporated into the 3 position of this peptide hormone. Within the framework of the above syntheses, several methodological questions of peptide and amino acid synthesis were studied.
Dissert. Abstr.

N76-28806 Rochester Univ., N.Y.
NONLINEAR DIFFUSION MODELS AND SPATIAL INTERACTIONS IN BIOLOGICAL SYSTEMS Ph.D. Thesis
Ronald Morris Shymko 1976 167 p
Avail: Univ. Microfilms Order No. 76-14787

The effects of spatial structure on the qualitative dynamics of nonlinear biological systems are studied. Nonlinearly coupled diffusion equations are set up in order to take into account the spatial transport of the active components, and the possible modes of behavior are determined. Changes in the qualitative behavior (bifurcations) are found to occur as the spatial parameters such as size or shape are varied. Topics considered include: (1) a two-component coupled chemical system with spatially localized (heterogeneous) catalysts; (2) a mathematical model for the control of tissue growth by a diffusible mitotic inhibitor; and (3) a dynamical model for vision which incorporates the nonlinearities and lateral interactions known to exist in the visual system.
Dissert. Abstr.

N76-28807*# Agence Tunisienne de Public-Relations, Tunis.
NATURAL HISTORY OF AGARICINES
M. V. Fayod Washington NASA Jul. 1976 290 p refs Transl. into ENGLISH from Ann. Sci. Natur., Bot. Biol. Veg. (France), vol. 7, no. 9, May 1888 p 181-411
(Contract NSF C-504)
(NASA-TT-F-16514) Avail: NTIS HC $9.25 CSCL 06C

A Class of fungi, the Basidiomycetes, was studied (specifically, the Order Agaricales, which includes all forms of fleshy gilled mushrooms). Topics discussed include: (1) biological classification, (2) the morphology of fungal structures such as mycelium, sclerotial bodies, spores, stipes, gills, and pileus, and (3) reproductive cycles. Reference is made, where applicable, to the works of De Bary and other mycologists. A brief review of the natural groups of Agaricaceae is given. Also discussed are methods of collection and preservation for these fungi. J.R.T.

N76-28808*# Boeing Co., Houston, Tex.
TWO TECHNIQUES FOR ELIMINATING LUMINOL INTERFERENCE MATERIAL AND FLOW SYSTEM CONFIGURATIONS FOR LUMINOL AND FIREFLY LUCIFERASE SYSTEMS Quarterly Report, Jan. - Mar. 1976
Richard R. Thomas Jan 1976 18 p refs
(Contract NAS5-22545)
(NASA-CR-144768) Avail: NTIS HC $3.50 CSCL 06C

Two methods for eliminating luminol interference materials are described. One method eliminates interference from organic material by pre-reacting a sample with dilute hydrogen peroxide. The reaction rate resolution method for eliminating inorganic forms of interference is also described. The combination of the two methods makes the luminol system more specific for bacteria. Flow system designs for both the firefly luciferase and luminol bacteria detection systems are described. The firefly luciferase flow system incorporating nitric acid extraction and optimal dilutions has a functional sensitivity of 3 x 100,000 E. coli/ml. The luminol flow system incorporates the hydrogen peroxide pretreatment and the reaction rate resolution techniques for eliminating interference. The functional sensitivity of the luminol flow system is 1 x 10,000 E. coli/ml. Author

N76-28809 Kansas Univ., Lawrence.
RECOVERY DURING RADIATION AND CHEMICAL MUTAGENESIS Ph.D. Thesis
Dennis Frank Deen 1975 213 p
Avail: Univ. Microfilms Order No. 76-16714

These investigations were directed toward the study of recovery in radiation and chemical mutagenesis in cultured mammalian cells. A mutagenesis system was established in which mutation of V79-171b Chinese hamster cells to 8-azaguanine resistance was tested. The effects of split dose and postirradiation treatments upon both X-ray and EMS induced mutagenesis were determined. Observations and conclusions are presented.
Dissert. Abstr.

N76-28810 Utah Univ., Salt Lake City.
DIAGNOSTIC APPLICATION OF MICROWAVE RADIATION Ph.D. Thesis
Peder Christian Pedersen 1976 178 p
Avail: Univ. Microfilms Order No. 76-16574

The feasibility of applying low intensity microwave radiation in the diagnosis and monitoring of pathological pulmonary conditions such as pulmonary edema and emphysema is considered. The significant change in total lung water which is a characteristic of pulmonary edema and emphysema modifies the permittivity and conductivity of the lung tissue. Both the reflection technique and the transmission technique have been investigated with single frequency and swept frequency measurements. With the single frequency reflection technique, dynamic events such as respiration or cardiac rhythm have been measured, and animal experiments have indicated that this technique is applicable for monitoring of the progress of pulmonary edema. Using the swept frequency transmission technique, the transmission coefficient was measured on a phantom model of the chest. Changing the 'lung' water content of the phatom model produced significant changes in the transmission coefficient later confirmed by theoretical calculations. Dissert. Abstr.

N76-28811 Texas Univ., Austin.
THE MEASUREMENT OF THRESHOLD TEMPERATURES IN THE OCULAR FUNDUS FOR LASER INDUCED, VISIBLE LESIONS Ph.D. Thesis
Leslie Alexander Priebe 1975 209 p
Avail: Univ. Microfilms Order No. 76-14505

Measurements of temperature increases resulting from exposures to argon laser irradiations were made in the eyes of living rhesus monkeys with 10-20 micrometers thermocouples. Using the appearance of an ophthalmoscopically visible lesion as the criterion for damage, the temperature associated with the appearance of a threshold lesion 5 minutes post exposure was determined. Temperature increases at the center of the lesion and at the radial extent of the lesion were determined from radial scans of the thermocouple through the laser image and from ophthalmoscope measurements of the lesion radius.
Dissert. Abstr.

N76-28812 Utah Univ., Salt Lake City.
LONG-WAVELENGTH ANALYSIS OF ELECTROMAGNETIC POWER ABSORPTION BY PROLATE SPHERODIAL AND ELLIPSOIDAL MODELS OF MAN Ph.D. Thesis
Habibollah Massoudi 1976 217 p
Avail: Univ. Microfilms Order no. 76-15572

An electromagnetic (EM) field perturbation technique is used to obtain the induced fields and the associated power deposition in both prolate spheroidal and ellipsoidal models of man and experimental animals being irradiated by an EM plane wave when the wavelength is long compared to the major axis of the spheroid or ellipsoid. Calculations of the power absorbed by both spheroidal and ellipsoidal models of man and animals are given for different frequencies and orientations of the models with respect to the incident field vectors. The effects of tissue anisotropy on power absorption in planar and spherical models are also investigated. The results show that marked differences in tissue absorbed power can occur due to tissue anisotropy at frequencies below 10 MHz. The quantitative data resulting from this study are valuable for estimating tissue EM power absorption in experimental animals and man.
Dissert. Abstr.

N76-28813*# Joint Publications Research Service, Arlington, Va.
EFFECTS OF ABRUPT TIME ZONE CHANGE ON SOME CIRCADIAN RHYTHMS IN MAN
N. I. Moiseyeva Washington NASA Jul. 1976 10 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 61, no. 12, Dec. 1975 p 1798-1804
(NASA Order W-13183)
(NASA-TT-F-17117) Avail: NTIS HC $3.50 CSCL 06P

Changes have been demonstrated in circadian rhythm indices of the cardiovascular system in essentially healthy individuals, in the course of transmeridional flights, particularly when crossing over 9 time zones. The nature of the changes depends on the direction of the flight. After flying to the east, the reactions appear immediately: decreased duration of sleep, arterial pressure drops, and there is leveling off of daily fluctuations of cardiovascular system indices. After flying to the west, the changes begin on the 2d day: shorter duration of sleep, change in sleep pattern, increased range of changes in EEG frequencies, altered fluctuations of tonus of the cardiovascular system. The sleep rhythm disturbances associated with flights in both directions disappear in about 1 week; the cardiovascular system changes disappear in 2 weeks after flying west and in over 1 month after flying east. Intake of soporifics during the flight accelerates the process of adaptation to new time zones.
Author

N76-28814*# Kanner (Leo) Associates, Redwood City, Calif.
DRUG/RECEPTOR INTERACTIONS: THE EXAMPLE OF THE CARDIAC GLYCOSIDE RECEPTOR OF THE ERYTHROCYTE MEMBRANE
Erland Erdmann Washington NASA Aug. 1976 17 p refs Transl. into ENGLISH from Blut (West Ger.), vol. 32, no. 2, 1976 p 61-70
(Contract NASw-2790)
(NASA-TT-F-17151) Avail: NTIS HC $3.50 CSCL 06E

An example of an analysis of a drug/receptor interaction is described. According to this analysis the receptor for cardiac glycosides is on the outside of the erythrocyte membrane and is located on a protein which spans the membrane. This protein is believed to be (Na(+) + K(+))-ATPase.
Author

N76-28815# Little (Arthur D.), Inc., Cambridge, Mass.
CURRENT AWARENESS SERVICE FOR TOXIC SUBSTANCES (CATS). CUMULATIVE REPORT NO. 1, PART 1
Dec. 1975 500 p refs
(Contract EPA-68-01-2694)
(PB-250074/2; EPA-560/7-75-003-1; ADL-C-77355-Pt-1)
Avail: NTIS HC $12.50; HC also available in set of 2 reports as PB-250073-SET, HC $24.00 CSCL 06T

The two part cumulative report contains 26 current awareness documents prepared biweekly from 26 August 1974 through 11 August 1975, during the first year of a two year project. The purpose of this project was to provide the Office of Toxic Substances (OTS), U.S. Environmental Protection Agency with information on new uses of existing chemical products and with information of obvious potential environmental concern for both new and existing chemical products. For each biweekly document a core list of approximately 80 journals was scanned for information of interest to OTS on more than 30 topics (compounds, classes of compounds, and subject areas, e.g., model ecosystems). Abstracts were prepared for all items selected and these abstracts were presented biweekly under the assigned topics. In addition, a 'General Information' section was added to accommodate abstracts for topics not included in the original list of scanning topics.
GRA

N76-28816# Little (Arthur D.), Inc., Cambridge, Mass.
CURRENT AWARENESS SERVICE FOR TOXIC SUBSTANCES (CATS). CUMULATIVE REPORT NO. 1, PART 2
Dec. 1975 507 p refs
(Contract EPA-68-01-2694)
(PB-250075-9; EPA-560/7-75/003-2; ADL-C-77355-Pt-2)
Avail: NTIS HC $12.75; HC also available in set of 2 reports as PB-250073-SET, HC $24.00 CSCL 06T

For abstract, see part 1.

N76-28817# National Inst. for Occupational Safety and Health, Rockville, Md.
CRITERIA FOR A RECOMMENDED STANDARD. OCCUPATIONAL EXPOSURE TO CARBON TETRACHLORIDE
Dec. 1975 155 p refs
(PB-250424/9; NIOSH-TR-76-133) Avail: NTIS HC $6.75 CSCL 06J

Recommended standards for safe exposure levels to chemical hazards found in the workplace are presented. It is recommended that occupational exposure shall be controlled so that workers are not exposed to carbon tetrachloride in excess of 2 ppm (12.6 mg/cu m) determined as a timeweighted average (TWA) exposure for up to a 10-hour workday, 40-hour workweek. Recommendations on environmental exposure, medical, labeling, sampling and analysis, personal protection, informing employees of the hazard, work practices and monitoring and record keeping are included.
GRA

N76-28818 Illinois Univ., Urbana.
TOWARD A RESPIRATOR CONTROL SYSTEM Ph.D. Thesis
John Peter Schill 1976 142 p
Avail: Univ. Microfilms Order No. 76-16189

The physiology of a patient who requires a respirator is deranged in a sufficiently unique manner as to make a general complex modeling impractical. A basic approach is taken emphasizing the gas exchange function of the human respiratory system and the maintenance of this exchange through proper use of pulmonary mechanics. A model that is amenable to application control theory is developed and justified. Optimal control theory is applied to the dynamic equations of the model to yield design equations (control laws) of a controller. Several different formulations of the control problem are considered and comparisons made. Specifically, the continuous formulation of

the control problem for both time optimal and quadratic performance indexes, sampled-data formulation for both time optimal and quadratic performance indexes, and the continuous time optimal maximum principle formulation are considered.
Dissert. Abstr.

N76-28819*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
INTEGRATION OF VISUAL AND MOTION CUES FOR SIMULATOR REQUIREMENTS AND RIDE QUALITY INVESTIGATION Semiannual Status Report, Dec. 1975 - Jun. 1976
Laurence R. Young Jun. 1976 164 p refs
(Grant NGR-22-009-701)
(NASA-CR-148479) Avail: NTIS HC $6.75 CSCL 08H

Practical tools which can extend the state of the art of moving base flight simulation for research and training are developed. Main approaches to this research effort include: (1) application of the vestibular model for perception of orientation based on motion cues: optimum simulator motion controls; and (2) visual cues in landing.
Author

N76-28820*# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
MONITORING SPACECRAFT ATMOSPHERE CONTAMINANTS BY LASER ABSORPTION SPECTROSCOPY Final Technical Report, 1 Jan. 1974 - 31 Aug. 1976
J. I. Steinfeld 31 Aug. 1976 124 p refs
(Grant NGR-22-009-766)
(NASA-CR-148481) Avail: NTIS HC $5.50 CSCL 06K

Laser-based spectrophotometric methods which have been proposed for the detection of trace concentrations of gaseous contaminants include Raman backscattering (LIDAR) and passive radiometry (LOPAIR). Remote sensing techniques using laser spectrometry are presented and in particular a simple long-path laser absorption method (LOLA), which is capable of resolving complex mixtures of closely related trace contaminants at ppm levels is discussed. A number of species were selected for study which are representative of those most likely to accumulate in closed environments, such as submarines or long-duration manned space flights. Computer programs were developed which will permit a real-time analysis of the monitored atmosphere. Estimates of the dynamic range of this monitoring technique for various system configurations, and comparison with other methods of analysis, are given.
Author

N76-28821# Civil Aeromedical Inst., Oklahoma City, Okla.
EARPLUG RANKINGS BASED ON THE PROTECTOR-ATTENUATION RATING (P-AR)
Jerry V. Tobias Oct. 1975 62 p refs
(AD-A024756/9; FAA-AM-75-11) Avail: NTIS HC $4.50 CSCL 06/17

Forty-five attenuation spectra for earplugs were classified according to a simplified method designed to produce single number ratings of noise reduction. The rating procedure was applied to the mean attenuation scores, to mean-minus-one-standard-deviation scores, and to mean-minus-two-standard-deviations scores. The reporting of all three numbers seems to give the fairest indication of an earplug's value in controlling hearing damage in noise-exposed populations. The tests are described and ranked.
Author

N76-28822# Systems Technology, Inc., Hawthorne, Calif.
A MODEL FOR HUMAN PILOT BEHAVIOR DURING WAKE VORTEX ENCOUNTER UPSETS Final Report, Jun. 1974 - Dec. 1975
Walter A. Johnson and Thomas T. Myers Apr. 1976 38 p refs
(Contract DOT-FA73WA-3276)
(AD-A024534/0; TR-1035-5; FAA-RD-76-8) Avail: NTIS HC $4.00 CSCL 06/19

A model for pilot behavior is needed to more completely analyze the consequences (including hazard assessment) of wake vortex encounter upsets during final approach. Such a model was developed to describe a pilot's roll control behavior during a vortex upset. This model resulted from abstracting the salient characteristics of the many vortex encounters recorded during two moving-base piloted simulations at NASA Ames Research Center. The model allows for several discrete modes of behavior and includes an associated set of switching logics. The model is the result of a lengthy sequence of analytical steps. A description of the resulting model and several example applications are presented.
Author

N76-28823# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
DEVELOPMENT OF TWO NEW OXYGEN SELF-RESCUERS
R. L. Stein Jan. 1976 32 p refs
(PB-250809/1; BM-RI-8102) Avail: NTIS HC $4.00 CSCL 06K

The new oxygen self-rescuers are designed to be carried by a miner while he is at work and are used during emergency escape. These devices supply high-purity oxygen to the user and, at the same time, absorb CO2. One of the new self-rescue breathing units is a 10-minute self-contained apparatus. Its size and weight are comparable to the currently used self-rescue devices. The second device is a 4.5 lb package that supplies one hour of oxygen to the miner. Both devices have a canister that contains the oxygen-producing and CO2-absorbing potassium superoxide chemical, a breathing bag, a bite-type mouthpiece, noseclip, goggles, and hoses connecting the canister and mouthpiece.
GRA

N76-28824# Ultrasystems, Inc., Phoenix, Ariz. Dynamic Science Div.
EVALUATION OF SELF-CONTAINED ANTHROPOMORPHIC DUMMY DATA ACQUISITION SYSTEM Final Report, 1 Oct. - 31 Dec. 1975
E. Enserink Feb. 1976 143 p
(Contract DOT-HS-6-01295)
(PB-250722/6; DOT-HS-801-827; Rept-3961-75-178) Avail: NTIS HC $6.00 CSCL 14B

The test program evaluated a self contained solid state digital data acquisition system mounted in a 50th percentile male anthropomorphic dummy. Five automobile crash tests of various types were conducted with the crash recorder-equipped dummy occupying different seating positions in each test and restrained by either conventional belts or an air cushion restraint system. Following each test the data were extracted from the self contained recorder and transcribed onto a magnetic tape for further processing and the computation of dummy injury criteria.
Author (GRA)

N76-28825# Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
PERSONAL HEARING PROTECTIVE DEVICES, FITTING, CARE, AND USE
Doug Ohlin Jan. 1975 54 p refs
(AD-A021408) Avail: NTIS CSCL 06/17

The technical guide gives guidance for the establishment of occupational hearing conservation programs and information deemed useful for personnel having the responsibility for fitting and issuing hearing protective devices.
GRA

N76-29891* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHOD OF DETECTING AND COUNTING BACTERIA Patent
Grace L. Picciolo and Emmet W. Chappelle, inventors (to NASA) Issued 27 Jul. 1976 6 p Filed 5 Mar. 1975 Supersedes N75-21921 (13 - 13, p 1548) Continuation-in-part of abandoned US Patent Appl. SN-475337, filed 31 May 1974
(NASA-Case-GSC-11917-2; US-Patent-3,971,703; US-Patent-Appl-SN-475337; US-Patent-Appl-SN-555641; US-Patent-Class-195-103.5R) Avail: US Patent Office CSCL 06M

An improved method is provided for determining bacterial levels, especially in samples of aqueous physiological fluids. The method depends on the quantitative determination of bacterial adenosine triphosphate (ATP) in the presence of nonbacterial

ATP. The bacterial ATP is released by cell rupture and is measured by an enzymatic bioluminescent assay. A concentration technique is included to make the method more sensitive. It is particularly useful where the fluid to be measured contains an unknown or low bacteria count. Official Gazette of the U.S. Patent Office

N76-29892*# Oregon Univ., Portland. Dept. of Neurology.
DEFINITION OF PERFORMANCE SPECIFICATIONS FOR AUTOMATED ANALYTICAL ELECTROPHORESIS FACILITY (AAEF) Final Report, 7 Apr. 1975 - 29 Feb. 1976
D. E. Brooks 29 Feb. 1976 137 p refs
(Contract NAS8-31386)
(NASA-CR-149957) Avail: NTIS HC $6.00 CSCL 06B

In order to provide specifications for the automated Analytical Electrophoresis Facility (AAEF) that would satisfy the broadest variety of demands of a future user community, a survey was carried out of all those people who were identified as having published papers on cell electrophoresis in the past four years. A computer search was conducted of the relevant literature from which a list of 87 investigators was derived and defined as the user community for purposes of the mailing. A questionnaire was developed covering the areas of performance which required definition which was subsequently circulated to the user community. Based on the response to this survey performance specifications were assembled. Author

N76-29893# Wisconsin Univ. - Parkside, Kenosha.
EFFECTS OF EXTREMELY LOW FREQUENCY ELECTROMAGNETIC FIELDS ON PHYSARUM POLYCEPHALUM Technical Report, 15 Sep. 1971 - 31 Dec. 1975
E. M. Goodman, Ben Greenbaum, and Michael T. Marron 1 Feb. 1976 67 p refs
(Contract N00014-76-C-0180; NR Proj. 201-126)
(AD-A021457) Avail: NTIS CSCL 06/18

When the myxomycete Physarum polycephalum is exposed to sinusoidal (45, 60, 75 Hz) or modulated (76 Hz) electromagnetic fields, the mitotic cycle is lengthened, shuttle streaming period is slowed, and the rate of respiration is depressed. Further, modulated fields appear to induce these alterations sooner and at lower intensities than sinusoidal waves. The findings so far do not admit a conclusion that exposure to weak ELF electromagnetic fields is deleterious for Physarum (or other organisms); it can be concluded, however, that these fields do significantly affect biological processes. GRA

N76-29894* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MINIATURE INGESTIBLE TELEMETER DEVICES TO MEASURE DEEP-BODY TEMPERATURE Patent
Jack M. Pope and Thomas B. Fryer, inventors (to NASA) Issued 27 Jul. 1976 5 p Filed 27 Oct. 1972 Supersedes N73-14093 (11 - 05, p 0503)
(NASA-Case-ARC-10583-1; US-Patent-3,971,362; US-Patent-Appl-SN-301418; US-Patent-Class-128-2P; US-Patent-Class-128-2H; US-Patent-Class-128-2.1A) Avail: US Patent Office CSCL 06B

A telemetry device comprised of a pill-size ingestible transmitter developed to obtain deep body temperature measurements of a human is described. The device has particular utility in the medical field where deep body temperatures provide an indication of general health.
Official Gazette of the U.S. Patent Office

N76-29895* National Aeronautics and Space Administration. Pasadena Office, Calif.
MYOCARDIUM WALL THICKNESS TRANSDUCER AND MEASURING METHOD Patent
Cyril Feldstein (JPL), Gilbert W. Lewis (JPL), Robert H. Silver (JPL), and Virgil H. Culler, inventors (to NASA) (JPL) Issued 27 Jul. 1976 6 p Filed 5 May 1975 Supersedes N75-22689 (13 - 14, p 1652) Sponsored by NASA
(NASA-Case-NPO-13644-1; US-Patent-3,971,363; US-Patent-Appl-SN-574218; US-Patent-Class-128-2S; US-Patent-Class-128-2.05R; US-Patent-Class-338-6) Avail: US Patent Office CSCL 06B

A miniature transducer for measuring changes of thickness of the myocardium is described. The device is easily implantable without traumatizing the subject, without affecting the normal muscle behavior, and is removable and implantable at a different muscle location. Operating features of the device are described.
Official Gazette of the U.S. Patent Office

N76-29896* National Aeronautics and Space Administration. Pasadena Office, Calif.
CATHETER TIP FORCE TRANSDUCER FOR CARDIOVASCULAR RESEARCH Patent
Cyril Feldstein (JPL), Gilbert W. Lewis (JPL), Robert H. Silver (JPL), and Virgil H. Culler, inventors (to NASA) (JPL) Issued 27 Jul. 1976 5 p Filed 16 May 1975 Supersedes N75-25598 (13 - 16, p 2022) Sponsored by NASA
(NASA-Case-NPO-13643-1; US-Patent-3,971,364; US-Patent-Appl-SN-578241; US-Patent-Class-128-2S; US-Patent-Class-128-2.05E; US-Patent-Class-128-2.06E; US-Patent-Class-128-418; US-Patent-Class-128-419P; US-Patent-Class-73-398AR) Avail: US Patent Office CSCL 06B

A force transducer for measuring dynamic force activity within the heart of a subject essentially consists of a U-shaped beam of low elastic compliance material. Two lines extend from the beams's legs and a long coil spring is attached to the beam. A strain gauge is coupled to one of the beam's legs to sense deflections thereof. The beam with the tines and most of the spring are surrounded by a flexible tube, defining a catheter which is insertable into a subject's heart through an appropriate artery. The tines are extractable from the catheter for implantation into the myocardium by pushing on the end of the spring which extends beyond the external end of the catheter.
Official Gazette of the U.S. Patent Office

N76-29898*# Cornell Univ., New York. Lab. of Neurobiology.
CENTRAL NEURAL MECHANISMS GOVERNING POSTURAL CARDIOVASCULAR MECHANISMS Final Technical Report, 15 Jun. 1972 - 14 Jun. 1976
Donald J. Reis 14 Jun. 1976 293 p refs
(Grant NGR-33-010-179)
(NASA-CR-148603) Avail: NTIS HC $9.25 CSCL 06P

The results of the vestibular apparatus and cerebellum in orthostatic reflex control are summarized. Mechanisms within the brain which govern circulation reflexes and the consequences of disturbances in their function are also included. Author

N76-29899# Polish Academy of Sciences, Warsaw.
THERMAL EFFECT IN THE SOFT TISSUE FOR THE CASE OF FOCUSED ULTRASONIC FIELDS OF SHORT DURATION TIME
Leszek Filipczynski 1 Dec. 1975 19 p refs In POLISH; ENGLISH summary
Avail: NTIS HC $3.50

The temperature rise in the soft tissue was estimated for the case of focused ultrasonic beams as used in ultrasonography. Solving the heat conduction equation with the use of Laplace a transform a formula was obtained which makes it possible to calculate the approximate temperature distribution, in the focus prependicularly to the beam axis, as a function of time. The temperature increase for a 1 s pulse duration is of the same order as obtained in other experiments. For the ultrasonic dosage of 200 W/sq cm and 1 s time duration which corresponds with the threshold values for irreversible changes in the brain, a temperature rise of 33 C is obtained. F.O.S.

N76-29900# Oak Ridge National Lab., Tenn. Carcinogenesis Program.
INTERACTIONS OF CARCINOGENS WITH HUMAN CELL DNA: DAMAGE AND REPAIR
J. D. Regan 1975 18 p refs Presented at the Satellite of IUPHAR Cong., Turku, Finland, 25 Jul. 1975 Sponsored by ERDA
(Conf-750745-1) Avail: NTIS HC $4.00

The DNA of human cells was exposed to UV radiation, gamma radiation, N-acetoxyacetoamino fluorene, 4-nitroquinoline oxide.

ethyl methane sulfonate, propane sultone, and ICR-170. Following dBrVrd incubation and exposure to 313 nm radiation the number of strand breaks was recorded; the number of dBrVrd nucleotides inserted was also recorded. The significance of the results is discussed. NSA

N76-29901# Travenol Labs., Inc., Morton Grove, Ill.
TOXICITY OF COMPONENTS OF PLASTIC HAVING CONTACT WITH BLOOD Final Technical Progress Report, Jun. 1972 - Mar. 1975
J. E. Miripol, P. J. Garvin, I. J. Stern, and R. F. Wallin Sep. 1975 340 p refs
(Contract HB-22990)
(PB-251742/3; NIH-NO1-HB-22990) Avail: NTIS HC $10.00 CSCL 06T

Changes in the apparent volume of distribution of Di-(2-ethylhexyl) phthalate (DEHP) observed when acqueous suspensions were used for injection of the plasticizer indicated that differences in the systemic disposition and distribution of DEHP were dependent on the physical state of the dosage form. Whole body autoradiographic studies performed on mice infused with serum containing 14C-DEHP showed rapid accumulation labeled carbon in the kidney and liver with rapid excretion into urine, bile, and intestine. Essentially all the labeled compound was excreted within 24 hours. Rats infused twice weekly for 60 days with rat plasma containing DEHP extracted from PVC exhibited no toxicologically significant changes when compared to controls. GRA

N76-29902# Stanford Research Inst., Menlo Park, Calif.
EFFECTS OF OXIDANT AND SULFATE INTERACTION ON PRODUCTION OF LUNG LESIONS Final Report
Gustave Freeman and Laszlo T. Juhos Jan. 1976 29 p
(Contract EPA-68-02-1944)
(PB-251729/0; EPA-600/1-76-009) Avail: NTIS HC $4.00 CSCL 06T

An investigation is presented that was designed to determine the sub-acute and chronic effects of sulfuroxide inhalation alone and in combination with oxidant exposure on the respiratory system of laboratory animals. Preliminary experiments were being conducted to determine the optimum concentration of small-particle H2SO4 exposure to use in subsequent H2SO4-oxidant experiments. The comparative response of rats, guinea pigs and monkeys was determined. The effects of SO2-O3 mixtures were determined also. The principal biologic responses studied were the histopathologic response, including ultrastructural studies and autoradiographic assessment of cell turnover rates, biochemical studies and physiologic measurements. GRA

N76-29903# Southwest Research Inst., San Antonio, Tex.
BASELINE LEVELS OF PLATINUM AND PALLADIUM IN HUMAN TISSUE Final Report
Donald E. Johnson, R. John Prevost, John B. Tillery, David E. Camann, and John M. Hosenfeld Mar. 1976 252 p refs
(Contract EPA-68-02-1274)
(PB-251885/0; EPA-600/1-76-019) Avail: NTIS HC $9.00 CSCL 06T

The objective is to determine baseline levels of platinum and palladium in the population and environment prior to wide-spread use of catalyst-equipped vehicles. Lead is determined to ascertain the future epidemiological effect of non-leaded gasoline. The report presents the results of an epidemiological study of populations living near a freeway in Los Angeles, California and in the high desert region of Lancaster, California, for concentrations of platinum, palladium, and lead in blood, urine, hair, feces, autopsy tissues, ambient air, surface water and soil. Platinum and palladium are determined in samples from miners in Sudbury, Ontario, Canada, and metal refinery workers in New Jersey. Analytical methods are developed for platinum, palladium, and lead using atomic absorption spectrophotometry. GRA

N76-29904# Desmatics, Inc., State College, Pa.
RESEARCH ON CONSTRUCTION OF A STATISTICAL MODEL FOR PREDICTING IMPACT ACCELERATION INJURY
Dennis E. Smith Feb. 1976 35 p refs
(Contract N00014-74-C-0154; NR Proj. 105-757)
(AD-A021669; TR-102-2) Avail: NTIS CSCL 06/19

This report describes a statistical approach to development of a human impact acceleration injury prediction model based on experimental data obtained from human analogs. Also discussed is the use of preinjury criteria to provide more accurate estimates of model parameters. Author (GRA)

N76-29905# Optical Sciences Group, San Rafael, Calif. Visual Sciences Div.
INFLUENCE OF SOCIALLY USED DRUGS ON VISION AND VISION PERFORMANCE Annual Report, 1974 - 1975
Anthony J. Adams, Brian Brown, Merton C. Flom, Arthur Jamolsky, and Reese T. Jones 1 Apr. 1975 115 p refs
(Contract DADA17-73-C-3106)
(AD-A022024; Rept-751) Avail: NTIS CSCL 06/16

Eight visual functions were measured in these experiments; twenty-seven experienced marijuana and alcohol users participated. The experiments were performed double blind with placebo controls. The results are: (1) Dynamic visual acuity is reduced in dose-related-fashion by both alcohol and marijuana; (2) Alcohol produces large, dose-related increases in time taken to recover foveal sensitivity after bright light exposure; (3) Recovery of contrast sensitivity function in the peripheral retina after exposure to a bright light flash is prolonged by 1.0 ml/kg alcohol; (4) The maximum velocity of sinusoidal tracking is markedly reduced by alcohol and not by marijuana. This effect for the smooth pursuit system and the saccadic eye movement system is dose related for both systems; (5) Using power spectrum analysis, the investigators (a technique which allows examination of individual frequency components of eye movements), we the investigators have demonstrated alcohol and marijuana induced deficits in oculomotor tracking; (6) Color discrimination appears to be significantly reduced after alcohol (1.0 ml/kg) and marijuana (15 mg THX) in the blue region without apparent change in other spectral regions; (7) Static visual acuity, is unaffected by alcohol or marijuana in doses up to 1.0 ml/kg of alcohol and 15 mg THC; and (8) Peripheral gaze nystagmus is increased after alcohol and to a lesser extent after marijuana ingestion. GRA

N76-29906# Civil Aeromedical Inst., Oklahoma City, Okla.
EFFECTS OF GROUND TRAINER USE ON THE PSYCHOLOGICAL AND PHYSIOLOGICAL STATES OF STUDENTS IN PRIVATE PILOT TRAINING
Roger C. Smith and C. E. Melton, Jr. Mar. 1976 9 p refs
(AD-A024704/9; FAA-AM-76-2) Avail: NTIS HC $3.50 CSCL 05/9

Student pilots receiving all instruction in an aircraft and student pilots who received a portion of their flight training in a ground trainer were compared in terms of flying proficiency, psychological (anxiety) states during training, and certain physiological measures. It was found that pilot performance was equal in both groups, as measured by objective ratings and check pilot observations. There was no evidence that student pilot anxiety was differentially influenced by these two training procedures, although anxiety did vary as a function of the type of flight (dual, solo, evaluation). There were some trends in the physiological data to suggest slightly more favorable conditions in the ground trainer. No contraindications to ground trainer use were evident. Author

N76-29907# National Aviation Facilities Experimental Center, Atlantic City, N.J.
INVESTIGATION OF PILOT SELF-BRIEFING TECHNIQUES. VOLUME 1: METHODOLOGY, RESULTS, AND RECOMMENDATIONS Interim Report, Mar. - Oct. 1974
Hugh D. Milligan and Bruce L. Rosenberg Feb. 1976 83 p
(AD-A024645/4; FAA-NA-75-18-Vol-1; FAA-RD-75-90-Vol-1)
Avail: NTIS HC $5.00 CSCL 05/9

A study was conducted to assess the usefulness of automation techniques and devices developed for the purpose of providing pilots with the capability to obtain preflight weather briefings without the aid of a flight service station specialist. Both live and canned weather data were employed during the conduct of

the study to ascertain the validity of the basic concepts and to define improvements thereto. The data elicited from the activities, thus far, indicates that pilot self-briefing is a feasible approach which portends delivery of quality weather briefings with a concomitant cost reduction when compared to the cost of today's and any future labor intensive briefing system. This is a technical report containing information on design of the experiment; data collected, statistical analyses of results, and a summary narrative, conclusions and recommendations. Volume I contains the textual presentation of the experiments as well as the analyses and some tables presenting overall pilot responses. Author

N76-29908# Federal Aviation Administration, Oklahoma City, Okla.
AN EVALUATION OF THE EFFECTIVENESS OF THE FAA MANAGEMENT TRAINING SCHOOL
Roger C. Smith, Barbara Rana, and Deborah K. Taylor Sep. 1975 46 p refs
(AD-A025254/4; FAA-AM-75-9) Avail: NTIS HC $4.00 CSCL 05/9

An assessment of the FAA Management Training School (MTS) program is presented. Questionnaires for evaluating the MTS experience in terms of the usefulness and the quality of specific and general aspects of the course were presented to graduates at various FAA field offices and facilities. It was found that supervisors and managers felt that the program had been useful in helping them to meet the demands of their positions. Areas in need of improvement are indicated. Questionnaires concerning specific types of behavior desired of supervisors and managers were completed by graduates of MTS, their immediate supervisors, and their employees and also by supervisors and managers not trained at MTS. It was found that MTS training resulted in an increase in desirable on-the-job activities of MTS graduates. Author

N76-29909*# McDonnell-Douglas Astronautics Co., Houston, Tex. Astronautics Div.
CONTINUATION OF ADVANCED CREW PROCEDURES DEVELOPMENT TECHNIQUES Final Report
J. D. Arbet, R. L. Benbow, M. E. Evans, A. A. Mangiaracina, J. L. McGavern, M. C. Spangler, and I. C. Tatum 30 Jul. 1976 64 p refs
(Contract NAS9-14780)
(NASA-CR-147843; MDC-W0018) Avail: NTIS HC $4.50 CSCL 05I

An operational computer program, the Procedures and Performance Program (PPP) which operates in conjunction with the Phase I Shuttle Procedures Simulator to provide a procedures recording and crew/vehicle performance monitoring capability was developed. A technical synopsis of each task resulting in the development of the Procedures and Performance Program is provided. Conclusions and recommendations for action leading to the improvements in production of crew procedures development and crew training support are included. The PPP provides real-time CRT displays and post-run hardcopy output of procedures, difference procedures, performance data, parametric analysis data, and training script/training status data. During post-run, the program is designed to support evaluation through the reconstruction of displays to any point in time. A permanent record of the simulation exercise can be obtained via hardcopy output of the display data and via transfer to the Generalized Documentation Processor (GDP). Reference procedures data may be transferred from the GDP to the PPP. Interface is provided with the all digital trajectory program, the Space Vehicle Dynamics Simulator (SVDS) to support initial procedures timeline development. Author

N76-29910*# Kanner (Leo) Associates, Annapolis, Md.
MODELING OF INTELLIGENT BEHAVIOR
N. M. Amosov, A. M. Kasatkin, and L. M. Kasatkina Washington NASA Aug. 1976 35 p refs Transl. into ENGLISH from the Russian Preprint-74-2
(Contract NASw-2790)
(NASA-TT-F-17126; Preprint-74-2) Avail: NTIS HC $4.00 CSCL 05J

A brief description is presented of the basic results produced in the course of experimental investigations of the capabilities of one heuristic approach to the problem of construction of models of thinking and intelligent behavior. Operating models of the process of human mental information processing are represented in the form of network structures with the semantics of M-networks and a specific excitation-inhibition system. Author

N76-29911# Civil Aeromedical Inst., Oklahoma City, Okla.
PHYSIOLOGICAL, SUBJECTIVE, AND PERFORMANCE CORRELATES OF REPORTED BOREDOM AND MONOTONY WHILE PERFORMING A SIMULATED RADAR CONTROL TASK
Richard I. Thackray, J. Powell Bailey, and R. Mark Touchstone Aug. 1975 11 p refs
(AD-A025426/8; FAA-AM-75-8) Avail: NTIS HC $3.50 CSCL 01/2

Several male subjects performed a simulated air traffic control radar task for 1 hour. Subjects were equally divided into three time-of-day groups and tested at 1,000, 1,300, and 1,530. The subject's task was to respond as rapidly as possible to infrequent changes in alphanumeric symbols. Blood pressure, oral temperature, skin conductance, body movement, heart rate and heart-rate variability, and performance measures of mean response latency and variability of response latencies were monitored. In addition, subjects rated their levels of boredom, monotony, irritation, attentiveness, fatigue, and strain at the beginning and end of the session. Two extreme groups of eight subjects each were then formed on the basis of their rated boredom and monotony and compared with respect to changes in each of the measures during the task period. Author

N76-29912# National Aviation Facilities Experimental Center, Atlantic City, N.J.
VISUAL ATTENTION OF PRIVATE PILOTS, THE PROPORTION OF TIME DEVOTED TO OUTSIDE THE COCKPIT Final Report, May 1972 - Mar. 1975
Richard L. Sulzer and Gerald E. Skelton May 1976 25 p refs
(AD-A025468/0; FAA-NA-75-28; FAA-RD-76-80) Avail: NTIS HC $4.00 CSCL 01/2

The direction of the pilot's visual attention was recorded during three series of flights in a small aircraft. It was found that pilots using visual flight rules (VFR) spent approximately 50 percent of the time looking outside the cockpit, an airsearch time much higher than previously recorded for air-carrier cockpits. The remainder of the time, while occupied in the cockpit, the pilot might be likely to miss seeing an approaching aircraft. Hence, a test environment for pilot warning systems intended to aid visual detection of potential threats should employ a pilot workload that produces a realistic proportion of visual attention available for outside search. Author

N76-29913# Naval Training Equipment Center, Orlando, Fla.
THE EFFECT OF DELAY IN THE PRESENTATION OF VISUAL INFORMATION ON PILOT PERFORMANCE Final Report, Apr. 1974 - Jul. 1975
Fred R. Cooper, William T. Harris, and Vincent J. Sharkey Dec. 1975 78 p refs
(NAVTRAEQUIPCEN Proj. 6948)
(AD-A021418; NAVTRAEQUIPC-IH-250) Avail: NTIS CSCL 05/9

The effects of delay in the presentation of visual information on pilot performance during simulated carrier landing tasks were investigated. The TRADEC research flight simulator was used in conjunction with an Evans and Sutherland LDS 1 calligraphic visual display system for several different initial conditions, with and without delayed visual presentation, in conducting evaluations of pilot learning performance and piloting technique. The experimental construction, conduction, data analysis and results are presented. GRA

N76-29914# Human Resources Research Organization, Alexandria, Va.
GROUND OBSERVER ABILITY TO DETECT AND ESTIMATE

THE RANGE OF JET AIRCRAFT FLYING OVER HILLY TERRAIN

R. D. Baldwin, E. W. Frederickson, A. L. Kubala, M. R. McCluskey, and A. D. Wright Aug. 1968 100 p refs
(Contract DA-44-188-ARO-2)
(AD-A020657) Avail: NTIS CSCL 15/3

During a series of tests to provide operational and technical data for evaluating the capabilities of surface-based air defense systems against attacks by low-altitude high-performance aircraft, the capabilities of ground observers to detect and estimate the range to aircraft flying attack missions against prebriefed ground targets were examined. Observer performance was obtained for three aircraft flying three programmed speeds and two programmed altitudes. Sixteen observers searched a 180 deg sector for each trial, with early warning of an aircraft approach being provided for some trials. Three real time events--time at detection, time when the aircraft was at the estimated inbound range, and time when aircraft was at the estimated outbound range--were recorded for each observer for each trial. Author (GRA)

N76-29915# National Swedish Inst. for Building Research, Stockholm.

MENTAL AND PERCEPTUAL PERFORMANCE IN HEAT

Curt Johansson 1975 291 p refs
(PB-251439/6; D4:1975; ISBN-91-540-2463-3) Avail: NTIS HC $9.25 CSCL 06S

A review of heat-stress studies suggested that mental, perceptual, and psychomotor tasks have mainly been studied in laboratory experiments performed on heat acclimatized fit young men. The subjects were usually given extensive practice on the performance tasks, which were well learned prior to heat load. The exposure time varied from less than one hour to several hours. The emphasis recently shifted from an exploration of the relation between constant ambient temperature and performance to studies of performance changes under controlled hyperthermia or as a function of ambient temperature swings. GRA

N76-29916# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.

CHEMICALLY GENERATED SUPPLEMENTAL OXYGEN SYSTEMS IN DC-10 AND L-1011 AIRCRAFT Special Study

3 Mar. 1976 46 p refs
(PB-252023/7; NTSB-AAS-76-1) Avail: NTIS HC $4.00 CSCL 01B

The study examines the problems encountered in four recent decompression incidents with respect to the presentation, understanding, and use of chemically generated supplemental oxygen systems installed in DC-10 and L-1011 aircraft. These problems include lack of oxygen flow indications; headband adjustment difficulties; lack of mask stowage methods; unreliability of oxygen compartment doors; method of oxygen mask presentation; flight attendant training; and passenger briefings. The study finds that there is a need for design guidance from the FAA in the design of supplemental oxygen systems as well as a need for proving these systems by actual demonstration. GRA

N76-29917# Illinois Univ., Urbana. Coordinated Science Lab.

TRACKING: AN APPROACH TO DYNAMIC VISION AND HAND-EYE COORDINATION Ph.D. Thesis

V. C. Jones Dec. 1975 76 p refs
(Contract DAAB07-72-C-0259)
(AD-A021674; R696; UILU-ENG-75-2231) Avail: NTIS CSCL 09/2

Many applications for robots require the ability to work with moving objects. The problems encountered due to different types of motion are considered, and a method for providing a robot with real-time vision processing in dynamic environments is presented. By appropriately isolating the tracking task, it is possible to reduce the tracking problem to basic two dimensional pattern verification. Numerous features (potentially moving randomly) can be tracked while planning and recognition functions proceed independently. The tracking ability can also be used to provide a robot with visual feedback in real time for hand-eye coordination. GRA

N76-29918# Army Medical Intelligence and Information Agency, Washington, D.C.

ANTARCTIC CLOTHING

Eduardo Garcia Soto 17 Feb. 1976 6 p Transl. into ENGLISH from Boletin, Instituto Antartico Chileno (Chile), no. 8, 1975 p 26-28
(AD-A021714; USAMIIA-K-6181) Avail: NTIS CSCL 06/17

By the summer of 1972, the Chilean Antarctic institute (INACH, Instituto Antartico Chileno) had carried out exploratory activities in the Antarctic, preferentially in the coastal zones including studies on the food chains of fishes, benthic communities, tide gauging, etc. Starting in 1973, with the definitive organization of the Glaciological Group, investigations began in this scientific discipline and made necessary going further into the continent, therefore confronting a series of new problems of a logistic variety further requiring penetration, supervision, prevention of risks, ranging inward from the coasts, compulsory self-sufficiency, etc. As a consequence of the above, the requirement exists for making adaptations in clothing as well as a number of modifications in equipment used. Recommendations derived from experimentation are presented. GRA

N76-29919# Harry Diamond Labs., Adelphi, Md.

FLUIDIC SENSORS FOR LIFE SUPPORT SYSTEMS

James W. Joyce and Robert L. Woods Oct. 1975 45 p refs (HDL Proj. 379434)
(AD-A022016; HDL-TM-75-17) Avail: NTIS CSCL 06/11

Flueric bridge sensors have been developed for the Air Force as candidate sensors for measuring gas concentrations and temperatures in life support systems aboard aircraft. Three manifold assemblies -- each containing two flueric concentration sensors and one flueric temperature sensor -- were designed, built, and laboratory tested. In addition, equations describing the theoretical performance of both types of sensors were derived. Measured resistive coefficients for all bridge elements show very little nonideal effects for flows below 3.5 cu cm/sec. For one of the concentration sensors, known mixtures of carbon dioxide in nitrogen were measured; the results were in complete agreement with the theoretical predictions. No temperature-sensing data were gathered in this program. Author (GRA)

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